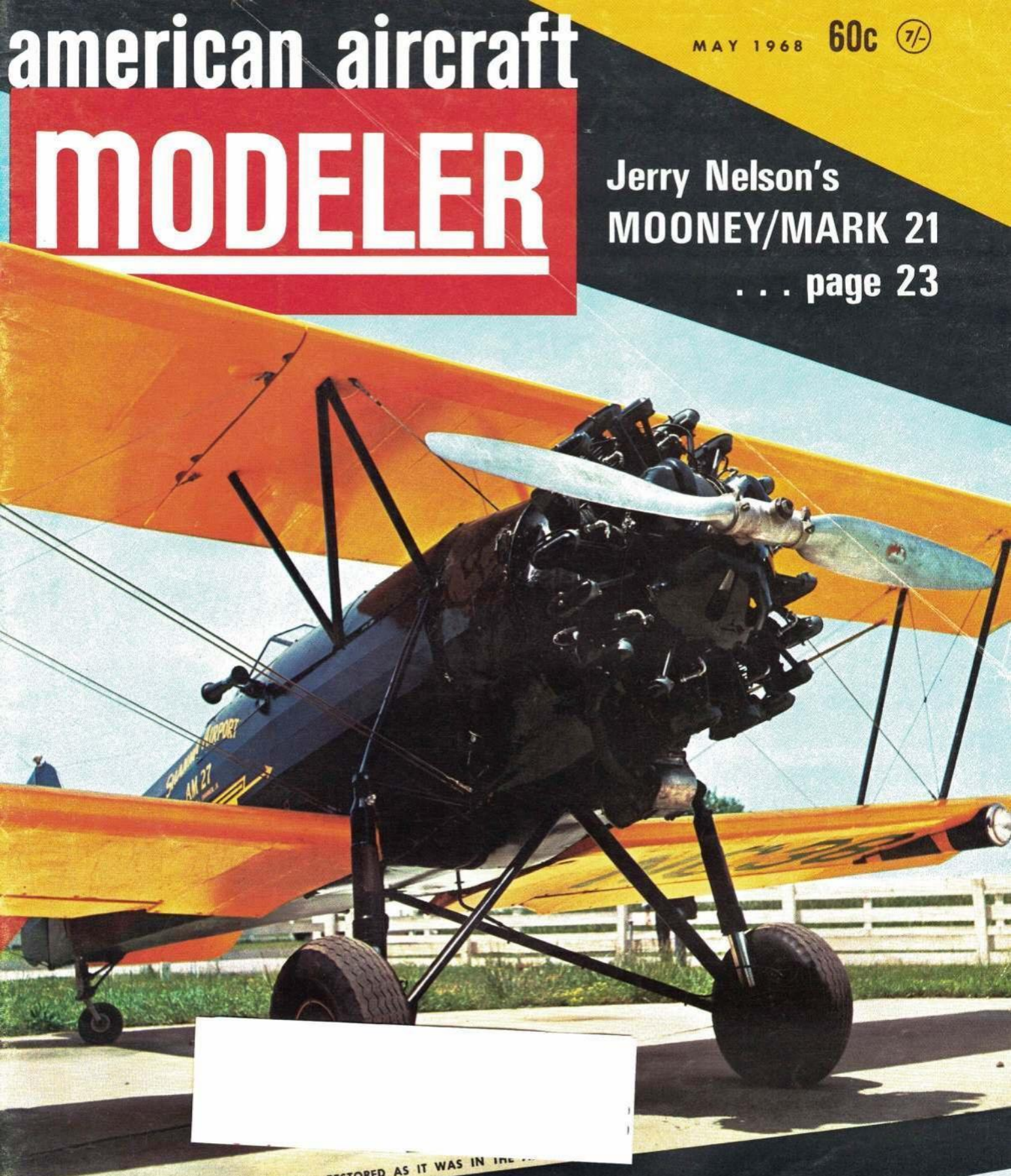
american aircraft MODELER

MAY 1968 60c 7/-

Jerry Nelson's
MOONEY/MARK 21
. . . page 23



PITCAIRN MAILWING: RESTORED AS IT WAS IN THE

The First
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Paul Matt: Berliner Joyce OJ-2 . . . page 27

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"BOATERS" THE LEADER IN QUALITY ENGINES

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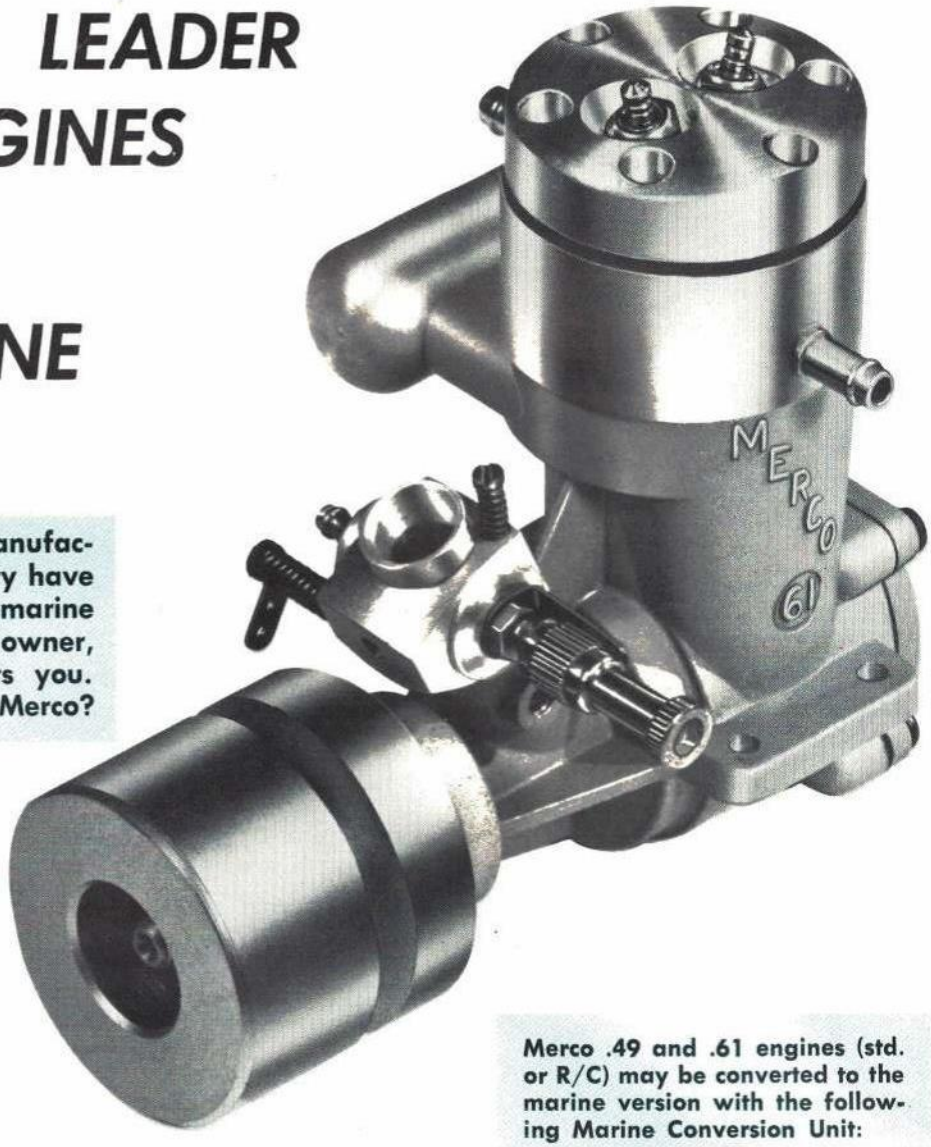

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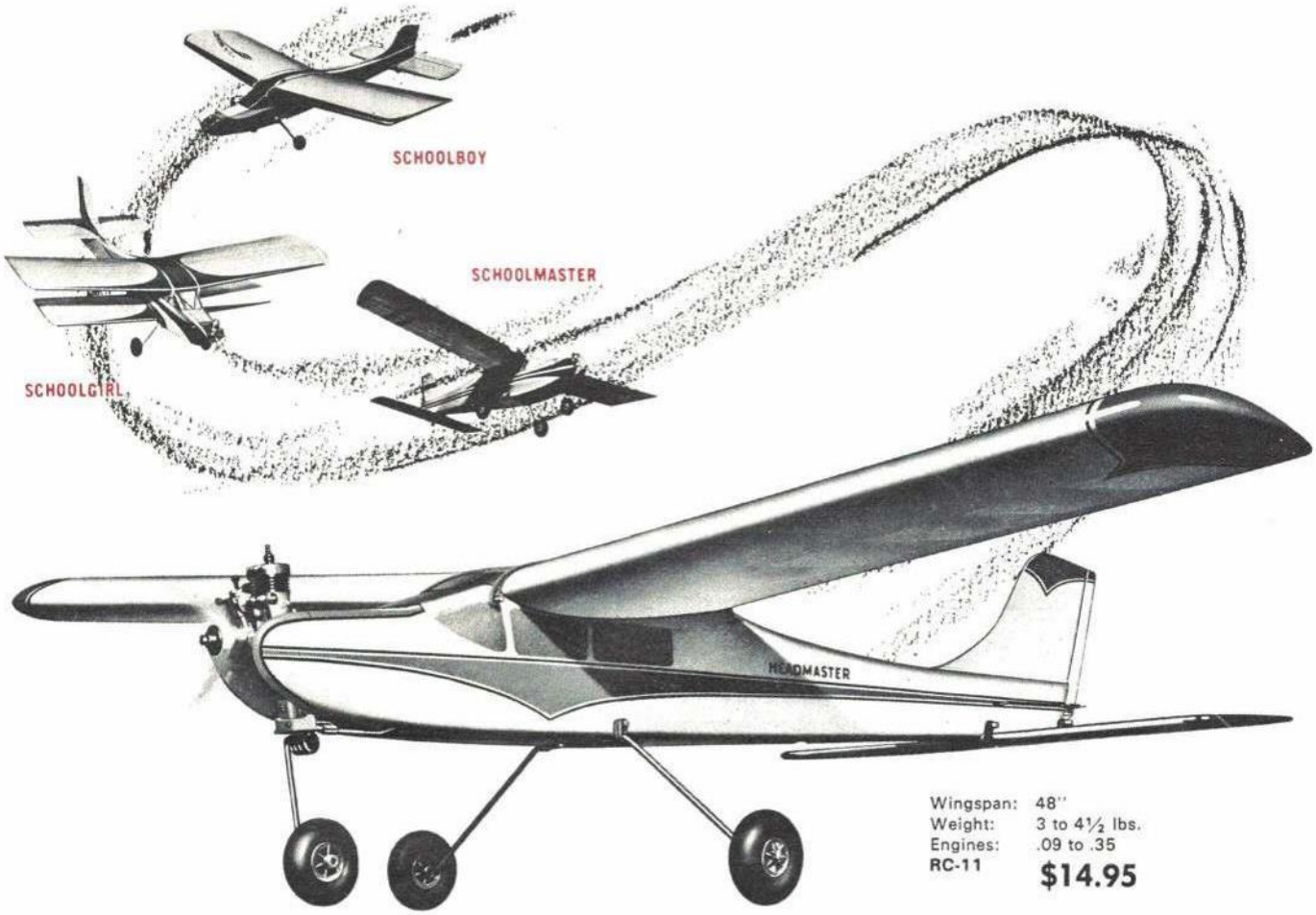
Royal Products Corporation

6190 EAST EVANS
DENVER, COLORADO 80222



Wingspan: 48"
Weight: 3 to 4½ lbs.
Engines: .09 to .35
RC-11 **$14.95**

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AMERICAN AIRCRAFT modeler

VOLUME 66, NUMBER 5 MAY 1968

COVER PHOTO: In mint condition, the Mailwing — from the 1927-1931 era — is the property of Shannon Airport, in Fredericksburg, Va. It is one of a number of historic aircraft in the airport museum. Ektachrome by Frank Pierce.

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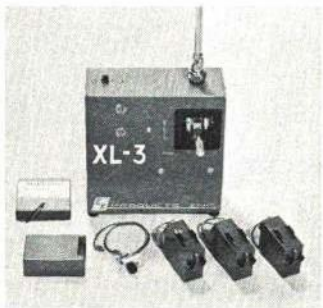
FROM THE RELIABILITY LEADERS

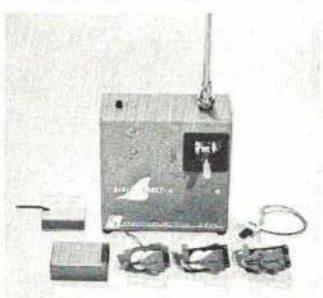
HI-REL LOGICTROL PROPORTIONAL RADIO CONTROL SYSTEMS

HI-REL XL-3 SYSTEM



This new HI-REL System from EK is ideal for beginners and for mini-size airplanes. It's extra little and extra light on the budget. The XL-3 offers three controls — two are proportional and motor control is positionable. It has the same HI-REL features as the dynamic LOGICTROL III Mini-System. The complete system includes a single stick transmitter, 3 Mini-Mite servos, a 4.8 v.—500 MA/HR nickel-cadmium battery, receiver, and switching harness. Operation instructions are included. Complete system price is $250 less charger and transmitter battery pack.

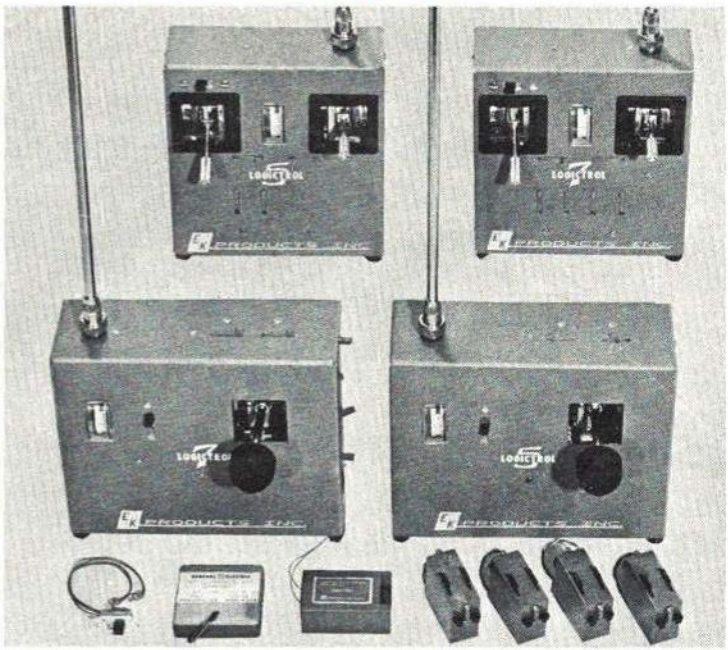
HI-REL DIGI-GHOST



The DIGI-GHOST uses the same HI-REL features found in the LOGICTROL III MINI-SYSTEM. A complete system includes transmitter, receiver, Rand actuator(s) 3.6 volt Nickel Cadmium battery, and switch harness. Charger and transmitter battery pack are not included. Two DIGI-GHOST models are available: The DG-1 (low rate) price is $135—The DG-2 (high rate) price is $180. The transmitter is equipped with a switch for low or high rate.

HI-REL LOGICTROL III

MINI-SYSTEM



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STRAIGHT AND LEVEL

Every January the clans gather at the Bisons' Conference. It's a great place for light-hearted bull sessions.

THE Buffalo Bisons' R/C Conference, held in January, is as comfortable as an old shoe. Attendance approached 400 this year. Many guys have logged all nine conferences. Unique at Buffalo is the large Canadian contingent — in fact, one trade exhibitor of a multi-proportional outfit was Canadian Radio Control Systems. Planes and boats displayed by modelers are distinguished for workmanship and finish. Boats really are out of this world. A room was filled with the most impressive craft, the super duper types with powerplant and shafting arrangements of ingenuity and quality. No Conference matches Buffalo in the marine field. Unfortunately, we did not have space to include Howard McEntee's report.

What do the experts do at these affairs? Well, we don't know whose room it was, but at 1 a.m. there were Carl Schmaedig, John Worth, Stu Richmond, Maynard Hill, Howard McEntee and yours truly. So we talked about the trend to ready-to-fly — oh, the pros and cons were properly evaluated — and got lost on the problems of a chap who has been assembling one for three months. And we talked about the old Jasco Days. . . .

If you are an easterner who goes back to before the war, Jasco is like the old homestead. In those days Maestro Frank Zaic, with several brothers and a sister (Christine and Alben run the present day Jetco) presided over a floating bull session which lasted for years. The back room was armpit deep in sawdust, the disposal system being huge cans held out the window in the general direction of careless garbage trucks and hapless pedestrians.

As we recall it, Jasco was a second-floor hole-in-the-wall on the lower East Side of New York, but a very special place, nonetheless.

Things were different. Totally. This subject lasted until Carl fondly recalled going down to the East River to reclaim balsa logs which unloading ships had carried as dunnage. Many a trip the boys made, loaded down with staggering piles of wood — staggering, that is, if you didn't know it was balsa. So there was Carl, not too big a guy, all but hidden under a king-sized bundle, just passing this urchin who remarked, "Geez, lookit that tough guy!"

Magazines, Navy, Nats, 600 sq. in. Goodyear, and then it was the *Scientific American* paper glider thing which, you'll recall, was last year's sensational promotion. What triggered the paper glider discussion was the appearance at the Buffalo Airport of "The Great International Paper Airplane Book." At $2.95 a throw, everybody was snapping it up. So now, Stu deftly tore a piece of paper and, with a couple of quick folds, demonstrated his Command Pilot rating in the paper glider Jagstaffle. Naturally, all true R/C experts must demonstrate their paper glider savvy.

Well, sir, then there had been this girl who defied a crowd of airplane types with a kind of "old propeller trick." She had folded a little rectangle of paper with a diagonal crease, tilting up the ends, as Maynard now demonstrated. You put this tiny prop against the tip of an outstretched forefinger, then move forward to make the thing spin. It helps if you make engine noises. If you are good, you can do loops, eights, and what not, as you dash about. Maynard couldn't do better than a 90-degree turn and no one else could do anything at all.

At breakfast, Maynard and Carl had solved the engineering problem, which Maynard demonstrated to the alarm of waitresses bearing trays. Watchado, is press down on the prop, where the shaft might go, to make a slight indent — just enough to center it. Now it was checkout time and paper props took over the lobby conversations. Somebody suggested a twin-engine design, with forefinger and pinky, the middle fingers tucked under. And as we said goodby, the last thing heard was "yeah, but then you got to make that multi-engine sound!"

Buffalo, like the MATS show held earlier in January, is particularly nice because of the traditional banquet. If you win anything during the prize giving — watch out! At both shows some way-out guys gather unique and appropriate gifts to hand out to well-known figures. One club at Buffalo, described as being up a creek, was given a broken canoe paddle. A boat expert was given a bag of water — it leaked, too. They find more old kits and laughable odds and ends, all handed out to the sparkling humor of some zany toast master like Jim Monyihan, and everybody in the hall has a ball. They go away happy.

Sure, there were exhibits, question-and-answer sessions, and things to do, but . . . Ran into the same crowd, plus Mr. and Mrs. Bill Hall, of Hallco; Bob Gierke, a U-control champ who had with him his latest Novi and a tricky gadget. So the R/Cers, always ready to chase any subject like the dogs chase the fox, climbed all over it. What this gismo does, is to hold low engine and wheel brakes. Bob starts the engine, walks calmly to the center of the circle, picks up his handle, releases brakes, slowly adds throttle and executes a picture-book takeoff. This is part of the trend to impress the judges. Some stunt pilots dress in white tornado clothes just to influence the judges. . . . and we discovered Bill Hall had been an old-time airplane designer, Aeronca mostly. Had much to do with the Champion design. So we told Bill it did not have enough fin area — and it didn't. That helped. Buffalo, here we come again!

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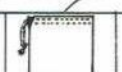

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Jimmy Bags by Rand #1022 Fits all size Transmitters

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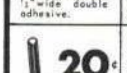

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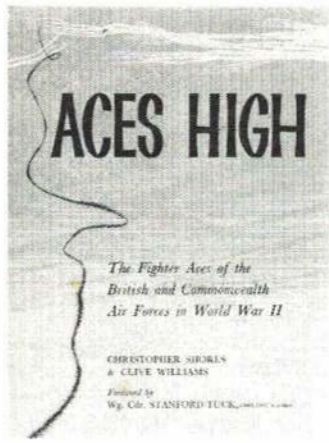
A.M. REVIEWS

STANLEY M. ULANOFF



Aces High, by Christopher Shores and Clive Williams, 335 pgs., $7.50. Published by Neville Spearman, Ltd., London and distributed by Aeronautica, John W. Caler, 7506 Clybourn, Sun Valley, Calif.

THIS is a record of the Fighter Aces of the British and Commonwealth Air Forces in World War II. The authors, members of the Air Aces Research Group of Air Britain, include over 1000 brief biographies of the operational careers of pilots who shot down five or more enemy aircraft during WWII and who served in the RAF, RAAF, RCAF, RNZAF and the FAA. Not only Commonwealth personnel but also Americans, Belgians, Czechs, Danes, Dutchmen, Frenchmen, Greeks, Icelanders, Irish, Norwegians and Poles were involved.

Some other features in this record are: a full list of aces according to their numerical score; a description of all the fighter operations throughout the war in which they participated; a resumé of achievements and the histories of air squadrons to which they belonged; a list of pilots who flew against the V-1s or buzz bombs, with their nationalities and scores; and a section — which should prove useful to modelers — containing details of the aircraft flown, their colors and markings and sideview drawings of individual aircraft.

Illustrated with 128 photographs of pilots and aircraft, **Aces High** is a comprehensive and highly readable reference book.

The Great International Paper Airplane Book, by Jerry Mander, George Dippel and Howard Gossage, 128 pgs., Paperback $2.95. Published by Simon and Shuster, 630 Fifth Ave., New York, N. Y.

FROM the **Scientific American** first International Airplane Competition held during the winter of '66-'67, an event which the authors describe as one "that has already taken its proper place in aeronautical history," comes this official record, analysis, and fly-it-yourself compendium of high-achievement paper airplanes. The competition, probably the funniest and most effective gimmick in magazine promotion history, was sponsored to explore possibilities of finding new designs for future supersonic transports. As the advertisement pointed out at that time, current Boeing and Lockheed SST (supersonic transport) proposals showed only the slightest improvement over popular paper airplane designs from the early 1920's.

Winning planes and some of the more interesting entries of the total 11,851 paper planes from 28 countries, are found in the book. Smallest plane was .08 x .00003 inches and the largest was 11 feet.

The authors also include "the behind-the-scenes story and official records of the competition, with photographs, facsimile documents and letters, and some pretty profound commentaries on historical, esthetic, technological and folklorical aspects of the Paper Airplane, its mystique and its implications for the future of aviation."

Organization of the book is also quite out of the ordinary: it contains one single chapter but abounds in interesting and amusing prefaces and appendices. The aviation fan, particularly the modeler, should find a great deal of earnestness and sound technical material in this otherwise spoofing and entertaining book.

Fighting Airman: The Way of the Eagle, by Charles J. Biddle; edited by Stanley M. Ulanoff, 289 pgs., $5.95. Published by Doubleday & Co., Inc. Garden City, N. Y.

THIS is a new edition of an out-of-print, best selling classic of WWI — the memoirs of the outstanding American ace, Major Charles J. Biddle. In a series of letters, Major Biddle recounts exciting adventures in the air as a fighter pilot with the French Air Service, the famed Lafayette Escadrille and the U. S. Air Service.

Compiling an excellent record as a student in the French aviation schools, Biddle went on to serve at the Western Front with the French elite "Stork" Squadron, joining other Americans later in the Lafayette Escadrille. After America's entry into the war, he transferred to the U. S. Air Service, attaining in November 1918, the rank of Major. Biddle distinguished himself as a commanding officer of the Fourth Pursuit Group and won the designation of Flying Ace. Other decorations included the

Legion d'Honneur, Croix de Guerre, with three Palms and the Ordre de Leopold (Belgium).

Major Biddle's memoirs are an important contribution to the history of WWI aviation warfare. Accounts of combat in the air highlight the tactics used by the opposing air services. In this re-issue of **The Way of the Eagle,** many features have been added by the editor, Stanley M. Ulanoff (Lt. Col.-USAR). The book now has appendices containing detailed specifications and data, with illustrations, of WWI aircraft; a chronology of the war; and leading allied and enemy aces, 1914-1918. Also included is a biographical sketch of Major Biddle by James Norman Hall and Charles Bernard Nordhoff, authors of the classic "Mutiny on the Bounty." Both Nordhoff and Hall served in the Lafayette Escadrille with Charles J. Biddle and later transferred with him to the U. S. Air Service.

(This review by Lt. Col. A. R. Druss, USAR Ret.)

The Life and Death of the Luftwaffe, by Werner Baumbach, 270 pgs., Pocketbook 75c. Published by Ballantine Books Inc., 101 Fifth Ave., New York, N. Y.

ABOUT Germany's bomber forces in WWII, it is a counterpart of the story of German fighter forces told by Adolf Galland in "The First and the Last."

Though only 29 at the end of the war, Werner Baumbach had already lived a fantastic career in aviation. Starting as a glider expert in the clandestine Luftwaffe under Goering, he saw combat as a dive bomber pilot at Dunkirk, and soon after, commanded the Luftwaffe forces in Norway, attacking Allied convoys on the Murmansk run. He led Germany's bomber fleets on the Russian front and in the Mediterranean and finished the war as General of the Bombers, highest post in the German bomber command.

Baumbach presents an inside view of German decisions and strategy, based on personal combat experience and the official Luftwaffe files — from the blitzkrieg in Poland and the fall of France to the Battle of Britain, the Stalingrad siege and the collapse of German air power.

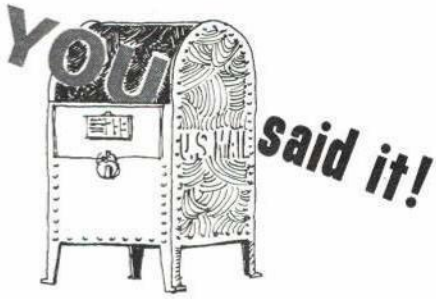
Baumbach, an outspoken critic of the Luftwaffe blunders committed by Goering and Hitler, was saved from dismissal only by his abilities. One of the reasons he attributes for Germany's early defeat — he leaves no doubt that an Allied victory was inevitable — was Hitler's own decision for a quick war. Germany was geared to win with what it had and could never successfully adjust to delays and changing needs. Other reasons, Baumbach suggests, were overcentralized control, erratic policy, red tape and inefficiency, inter-service rivalry and political favoritism.

Die Ritterkreuztrager der Luftwaffe Jagdflieger 1939-1945, by Ernst Obermaier, 256 pgs., $11.95. Published by Verlag Dieter Hoffmann, Mainz, West Germany, and distributed by Aeronautica, John W. Caler, 7506 Clybourn, Sun Valley, Calif.

THE Ritterkreuz (Knight's Cross) of the Eiserne Kreuz (Iron Cross) was the award established by Hitler for conspicuous bravery in action and outstanding merit in leadership. Hitler, as Supreme Commander, had the final decision on these awards; nominations came from the three branches of the service — Army, Navy and Air Force.

Later it became necessary to create further decorations for those soldiers who had already been awarded the Knight's Cross to reward them for new accomplishments.

Continued on page 64



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William M. Mueller, Parma, Ohio

You can't win 'em all

I'm getting fed up. Your magazine has too much about model airplanes — you never have articles about cars and so on anymore. I like race cars and go-go girls.

W. Poston, Dallas, Tex.

Come on now! Ed.

The case of the Brooklyn Sky-Scrapers

Congratulations! The new magazine looks and reads good, like a model magazine should. Have read each issue and passed them to my grandson, who has some interest in building. He's 15 and should have an interest in something besides the Beatles.

Editorial comment has been noted concerning the values of modeling. I believe the case of the old Brooklyn Sky-Scrapers, proves my contention that modeling is one of the greatest deterrants of juvenile delinquency.

The Sky-Scrapers came from all sections of Brooklyn, and took in some members from Westchester. They came from all types of homes and neighborhoods. They represented just about every type of racial background, from Jamaican to Chinese. But not one single member of that group had trouble with the law.

Today, they are grown men, doing well in society. As one of them said, "We were just too (blank) busy to mess around with anything but modeling."

We flew planes every weekend, rain or snow. To get there, a modeler who had no car was obliged to take a subway, transfer to a bus and walk a mile or so, carrying model and gear.

There seems to be something in modeling that brings out the creative. Most of our boys had no formal aeronautical training, but found that the basics they learned on the field enabled them to pass all sorts of tests when they entered the Air Force.

At every meeting we had at least 80% of the members present. We had to borrow an Italian-American Center's hall to hold them and even so, the proprietor made money selling Pepsi-Cola at 5c.

We had contests — the Eastern Championships held on the Island, drew so many cars we had to borrow a farmer's field just to park them and leave room for flying.

Right now I'm beginning to get the building urge. Wish I had plans for the old Buzzard Bombshell, but presume they are not available any more.

Carroll Moon, Wappingers Falls, N. Y.

Where are the youngsters?

Was interested in the editorial quoting Herbert Franck's "Toy Stigma" letter. As an old-time modeler (since 1936) I must confess that I've been somewhat baffled by the younger generation's lack of interest in model airplanes, or at least the flying models. What's wrong?

I believe the main reason for the decline and fall of the model builder is just plain disinterest on the part of our youngsters. My generation envisioned the future coming on shiny wings pulled by huge P&W radial engines, turning Hamilton Standard propellers. Today, a propeller is considered fit only to grace training planes and museum walls. Jets are fine, but how do you make a decent, cheaply constructed flying model of one? As a rule, it can't be done. Just take this example — a scale model of a Mig-23 that I built. It weighs 38 grams and is powered by a Jetex engine, and although it flew well in still air, I could hardly recommend it as a project for a young modeler.

Frank E. Millis, Sr., Denver, Colo.

More Peanuts than Elephants

For as long as I can remember I have been interested in model airplanes. We had airplane clubs and have flown stunt and combat, but never R/C. Why? I think the answer is that we just never felt we knew enough about it, and everyone was waiting for the next fellow to start the ball rolling. We don't live in an area where R/C is popular.

Just how does a person get started in R/C when there is no club nearby? How does a person learn how to fly R/C? I have three books on R/C but not one gives any information on how to actually fly the airplane. The articles in magazines like your own are so full of strange terms that I soon get discouraged and go back to control-line. I have no idea which systems are best, which need a license, etc.

In one editorial you spoke of the "middle-aged modelers who wanted nothing but flying machines which cost upwards of half a thousand dollars," and how you felt there were "more peanuts than elephants." How about giving us poor "peanuts" a break — the elephants have been stomping all over us for too long.

Eliot A. Kier, Avonmore, Pa.

The series for the beginner in R/C, titled "Getting Started in RC" by Howard McEntee, is a good beginning. Will think of something! Ed.

Achtung

Meine Lieben Herr Editor:

Gutt grief; Ich bin haben nuff dass stuput hund. Ich du habe fump DR-1, eachen mit zivei Spandau machine gunne. Ich bin reddy schussen dasse stuput hunde, atte dawre oder eny udder zeit.

Unser Herr, DER ROTE BARON

Alan Emanuel, Anaconda, Mont.

ACHTUNG! Das machine is nicht fur gerfingerpoken und mittengraben. Is easy schnappen der springenwerk, blowenfusen und poppencorken mit spitzernsparken. Ist nicht fur gerwerken by das Dummkopfen. Das rubbernecken sightseeren keepen hands in das pockets. Relaxen und watch das Blinkenlights.

Ed.

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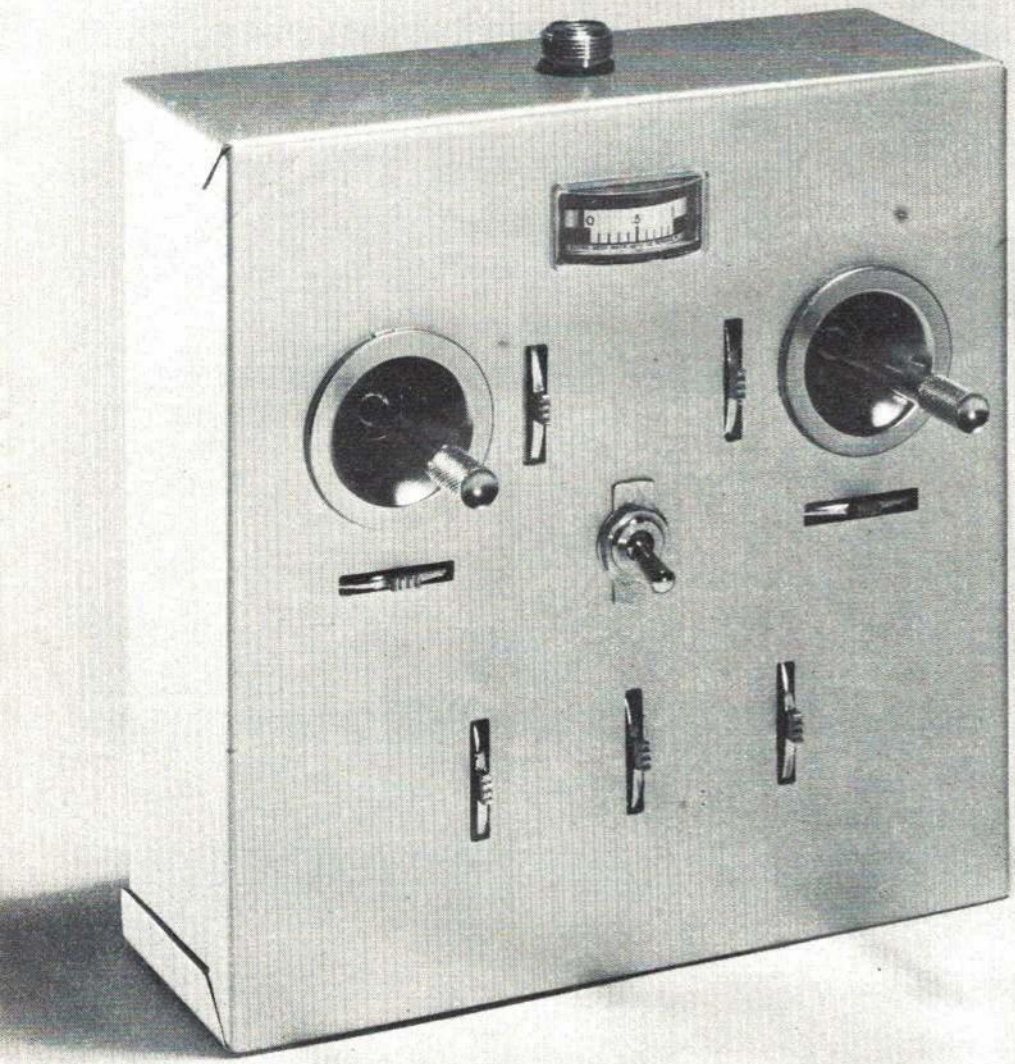

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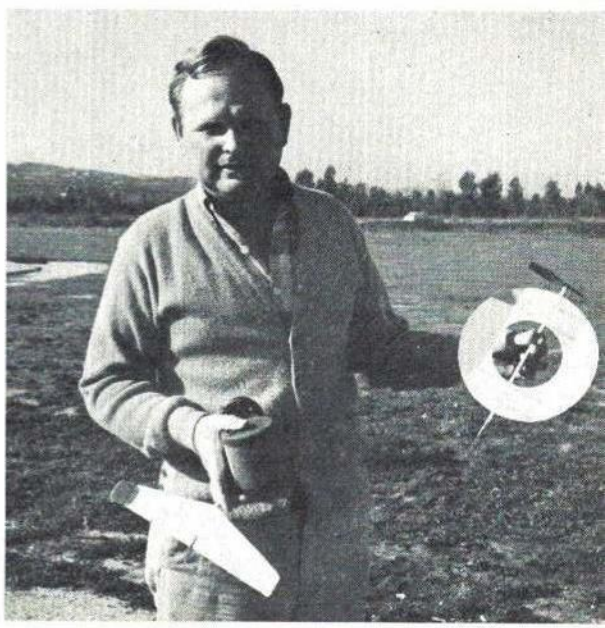
model world
...on the international scene

California club host to first annual, all flying-wing, meet

In Europe contests for tailless models are held frequently, but in the U. S. the activity has been almost extinct. Late last year, however, the Northrop Norair Model Airplane Club held a successful flying-wing meet in the Los Angeles area. The organizer was Jack W. Headley, editor of the club newsletter, shown at right, launching an original "Petrel" towline glider design (overall event winner) by Kevin Flynn. At center is one of Jack's gas-powered models, featuring swept-forward wings, apparently famous for its aerobatic antics. At lower right is Ray Caswell with two creations. The ring-wing is rubber-powered, and the other model is a hand-launched glider. The saucer placed second over many larger entires. Only one scale entry, a Northrop XP-56, was noted. All sizes, shapes and types of power were permitted. It was fitting that the Northrop model club was involved — the parent company is famous for full-scale tailless airplanes, the most famous of which was the XB-35 bomber of the late forties.

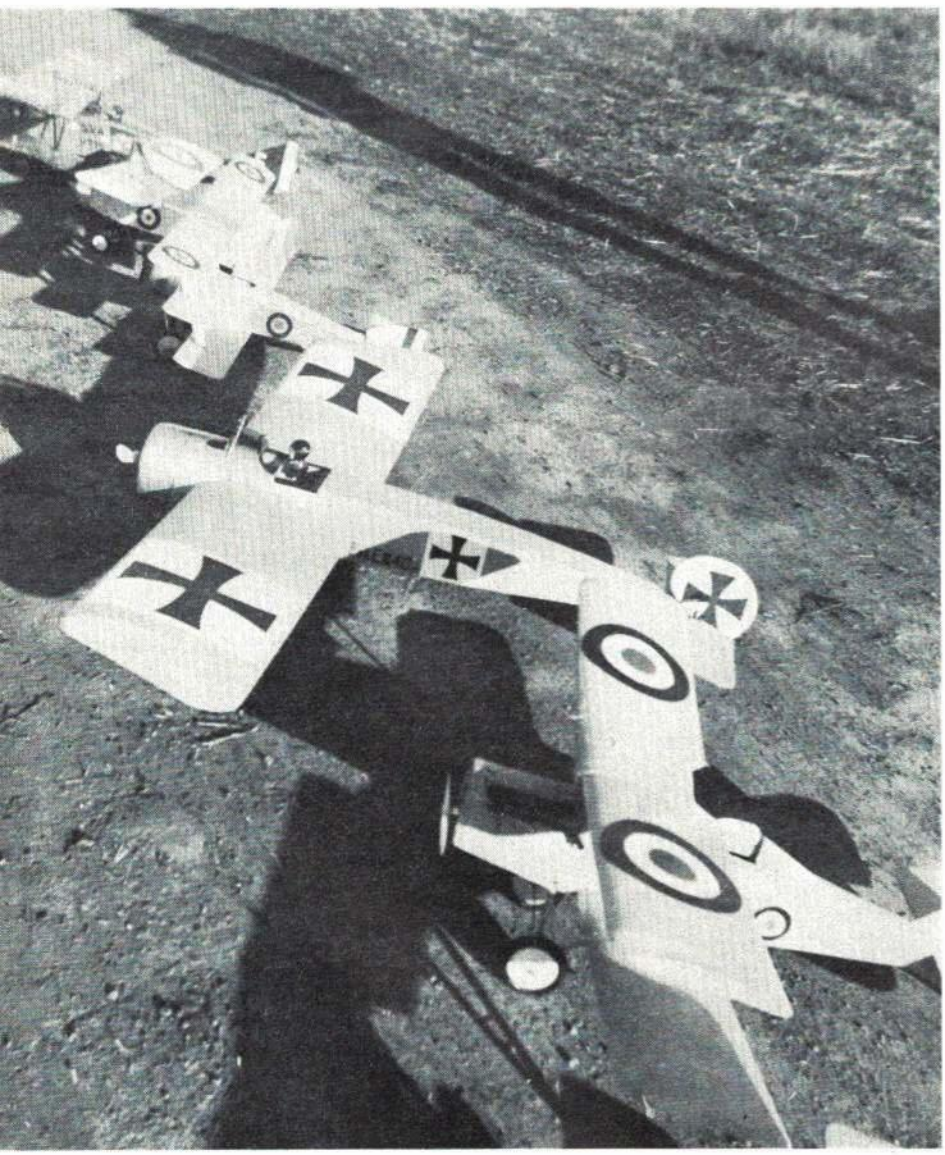
Winners feted at Nipponese Nationals

They didn't merely hand out a trophy to the winner of the Japanese RC National Championship held last year at Narusawa Yamanashi (near Tokyo) — there was a formal presentation fit for a prince. The occasion was marked with classic ceremonial dignity as Mishima, president of the contest, left, bestowed a certificate of achievement to the champion, Masahiro Kato. Otherwise the contest was equivalent to those held in other countries. All of the entrants used proportional gear, with Orbit in greatest use and OS next. All of the engines were in the 60 cu. in class. Dense fog hampered only the first round of the championship, which was run by FAI rules.



South American Air Force Base host to Fifteenth Colombian National Meet

For five days last December more than two thousand specators viewed the 15th National model meet held during the annual Sugar Cane Festival near the city of Cali in Colombia. Contestants were given royal treatment in the form of free Air Force transportation from all parts of the country. Cargo DC-4's were used for easy transport of models and equipment. Lodging and food were also provided on the base at minimum cost. Free flight, control line and radio control events were held, with many scale models involved. Especially noteworthy in CL scale were a four-engine Hercules and a Dyna-Jet-powered Sabre. The father-son team at near right, Eduardo and Jorge Caputi, took first in CL stunt, Senior and Junior events. The father's plane is a Shark 45 and the son's is a Nobler. The picture at right center shows a display of models provided for public viewing during the competition. At far right are shown the Junior category winners of the A-2 glider event. The gliders are all the Halcon-301 design, a Colombian kit which is very popular. The boy on the left is, again, Jorge Caputi, indicating that he is proficient in both control line and free flight. The others are Fernando Zapata and Gus Cardenas. In radio control, equipment problems plagued contestants. In one case the Air Force was preparing to use an air search to locate a flyaway Taurus, but the model was found before this operation got going. The meet ended with prize presentations by military and municipal officials, topped off by a cocktail party at the Air Force Club.

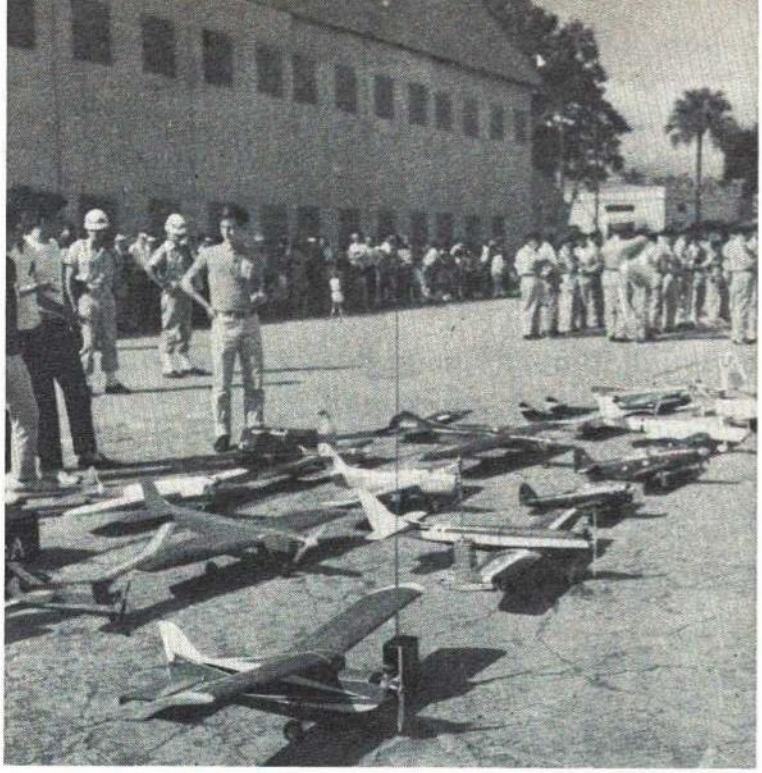


World War I air buffs sponsor contest for WW I models

Shown here are some of the models entered in the free flight scale contest restricted to WW I aircraft. Trophies were provided by the Cross and Cockade Society of California, a group of devoted WW I aero historians. The meet at Milpitas, Calif., was hosted by the 900 Club and directed by Joe Meckoll. The three prizes all went to Oakland Cloud Dusters members Earl Thompson (Nieuport 11), Marty Thompson (DH 4) and Dale Parks (SE 5a). Models were judged for both scale detail and flying ability, with scoring emphasis said to be placed on flying. A maximum of 25 points could be given for flight duration, realistic take-off, powered flight and glide — for a 100-pt. flight maximum. The maximum points established for scale judging under the rules was also 100.

Full-size aircraft modeled in miniature; old models also reconstructed

In recent years there has been substantial interest shown in building and having competitions for old-timer models. Sometimes there are competitions for pre-1938 models as well as for pre-1942 designs. And there may be classes for spark ignition and glow-plug. The big model shown at right is a replica of the 1937 Bowden Trophy winner, being launched by Wayne Schindler of Sunland, Calif. Schindler scaled up the 8-footer from Zaic's 1937 Yearbook. The model is powered by a Forster 99, ignition being supplied by three 500 ma nicad batteries. Unlike the original, this model has a dethermalizer and a modified Tatone flood-off timer. Imagine the cross-country chasing in those older days! Speck above model is a real airplane.



model world
...on the international scene

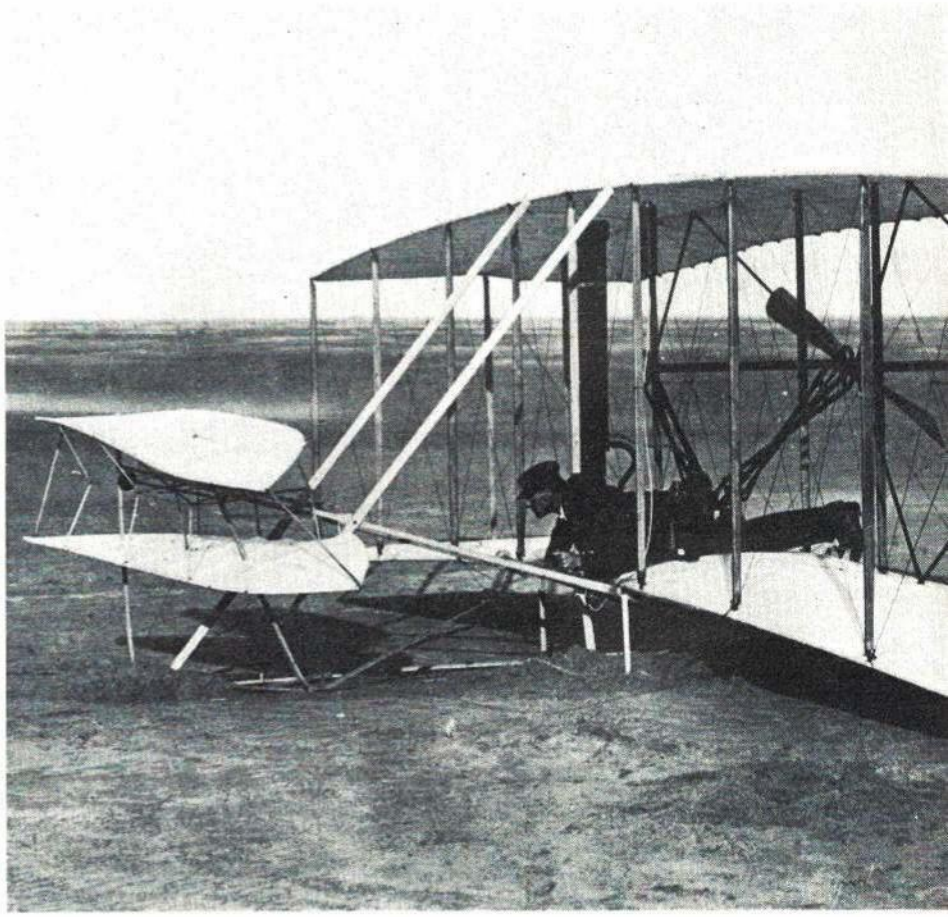
Four Keys to the Sky Part 2

The First Practical

Each piece of the puzzle was a scientific triumph, the end result a truly miraculous
a two-part article, the author recounts

DOUGLAS J. INGELLS

All illustrations courtesy of Smithsonian Institution National Air Museum.



THE idea of mechanical power flight certainly was not new with the Wright Brothers. There had been many attempts made by others before the Wrights even thought of building their first gliders.

In the 1840's Sir George Cayley, William Samuel Henson and John Stringfellow, a trio of Englishmen, experimented with steam-powered models. Stringfellow's design with a 20-foot wing span, and propelled by twin air screws, is credited with being the first engine-driven model airplane to fly.

Another Englishman, Thomas Moy and his assistant, R. E. Shill built their full-scale "aerial steamer" in 1875, a contraption powered by a three-horsepower steam engine and twin, six-bladed, windmill-like fans, and resting on what was probably the first tricycle landing gear. Tested at Crystal Palace, London, Moy's crude craft lifted its 120 pounds a few inches off a board platform, but that was the end of it.

Five years later, Thomas Edison applied his inventive genius to the development of a flying machine using a most unusual propulsion method. The inventor of the stock ticker as well as the light bulb, Edison used ticker tape made into guncotton jammed into a cylinder and exploded by an electric spark. This powerplant drove a rotor of a small helicopter model which Edison believed was the best approach to the problem of flight. If nothing else, he demonstrated that plane surfaces moving rapidly enough through the air would rise and carry some weight. He gave up the experiments when the engine blew up.

Another propulsion method using compressed air in a small cylinder was tried successfully in models flown by Lawrence Hargrave of Sydney, Australia in 1890.

About the same time the Frenchman, Clement F. Ader, built the "Eole" a man-carrying monoplane that weighed more than half a ton, propelled by a four-bladed airscrew driven by a 40-horsepower steam engine. The machine was uncontrollable and crashed, although it is claimed Ader flew it erratically for about 150 feet. Later improved models suffered similar fates.

American-born Sir Hiram Maxim, who became a British subject and was knighted by Queen Victoria in 1894, came closest to success with his huge machine, a multiplane with over 5,000 square feet of wing area, powered by twin giant propellers and a 350-horsepower steam engine which burned benzine. On a final test with Sir Hiram and an assistant aboard, the air leviathan almost achieved free flight, but Maxim shut off the steam when a crash was inevitable. He dropped the experiment after that, but recorded —"Propulsion and lifting are solved problems, the rest is a matter of time."

Time began to catch up quickly when the same year, Dr. Samuel Pierpont Langley, Director of the great Smithsonian Institution in Washington D. C., successfully flew his large model tandem monoplane powered by a steam engine. Launched by catapult Langley's Model No. 5, called the "Aerodrome," achieved power flight over the Potomac, and made a three-point landing on the wide river without serious damage. On the strength of this success, President McKinley appropriated $50,000 for Langley to use in the development of a full-scale, man-carrying, power-driven flying machine.

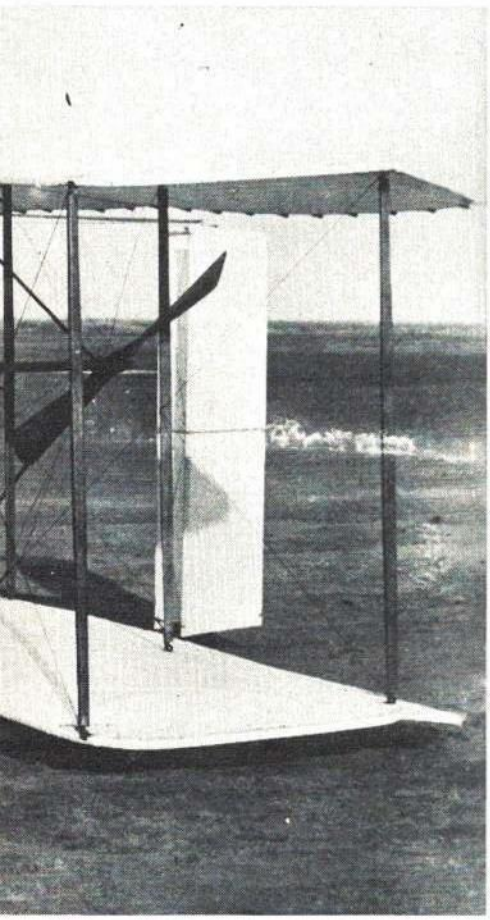
This machine, patterned along the same lines as the model "Aerodrome," only four times its size, was powered by a five-cylinder, radial, air-cooled gasoline engine. It was in a state of final development for flight tests about the same time that the Wright Brothers, back in Dayton after their glider success in 1902, started work on their proposed power flyer.

The Wright approach: The Wrights, of course, because of their extensive reading on the subject of aeronautics were well aware of these various experiments. "Sometimes, I think we read too much and were inclined to believe too much of what we read," Orville Wright once declared. "Certainly, this was true in the mis-information we had derived from

Flying Machine

achievement. Concluding

little known stories behind the Wright Brothers' persistent attempts to fly.



The brothers flipped a coin to see who would make that first flight. Wilbur won and was in the air about three seconds. (Orville made first successful flight.) Wilbur in damaged machine after his brief hop.

the knowledge of others with regard to air pressures on wing surfaces and wing design. But it was even more serious when we began thinking about the power flyer. On the basis of what had gone before, we were of the belief that propulsion methods were no serious challenge. . . . We truthfully thought we could buy a light-weight gasoline engine from one of the automobile builders, who were making great strides with the horseless carriage. And we believed we could design efficient propellers by merely applying known facts from previously published data. . ."

On the basis of their own design calculations for their power flyer, the Wrights decided that an engine of about eight horsepower and not weighing more than 200 pounds would be most satisfactory. But when they wrote to various automobile manufacturers they got negative answers. It was a sore spot with Orville.

"We believed," he often reflected, "that they (the auto builders) didn't believe much in human flight or anyone connected with it, so they simply avoided us in a polite manner."

It turned out they decided to design and build their own engine. As Orville pointed out, they had had a little experience in this area when they built a small, one-cylinder, air-cooled gasoline motor for their machine shop. (It drove the fan for their "magic wind box.") With this limited knowledge and the help of their mechanic, Charley Taylor, who ran the bicycle shop in their absence at Kitty Hawk, they set about building an engine for the glider. Orville referred to this glider as "the 444" because their plans called for a powerplant of "four cylinders, four-inch bore and four-inch stroke."

To make it lightweight, they used aluminum very extensively. The end result was most encouraging; complete with accessories their engine weighed only 170 pounds. The engine developed 12-horsepower, less than 15 pounds per horsepower which they considered a "decided advantage in weight," according to Orville. Although later he admitted, "We were to learn this wasn't a very good ratio, by the standards set by the automobile engine builders, who said it should have developed twice as much power for its weight."

Orville maintained, however, that they were more than pleased with their gasoline engine. For one thing, he pointed out that it weighed considerably less than they had allowed for (about 25 pounds less) and developed half again as much horsepower. Since they had counted on the engine weighing about one-third of the power flyer's total weight, and developing only eight horsepower, the decreased weight of the engine and its increased horsepower permitted them to "beef up" the airframe structure.

The engine, itself, was quite remarkable for its period. In configuration, it was an in-line engine, four cylinders in a row and water-cooled. It had a max rpm of about 1500, at times hitting as high as 16-horsepower for brief running periods. The gasoline tank was about a foot long and three inches in diameter, not much larger than a 2-pound coffee can. The tank carried half a gallon of fuel. According to Orville this was sufficient fuel to operate the engine for about 15 minutes; enough for a flight of about ten miles.

The Wrights designed the engine, but Charley Taylor built it. And one time Taylor told me — "It took about six weeks to build, then there was a lot of testing. . . . But the interesting thing is, when they left for Kitty Hawk with the power flyer, they told me to start work on another engine. They seemed pretty sure of success. . ."

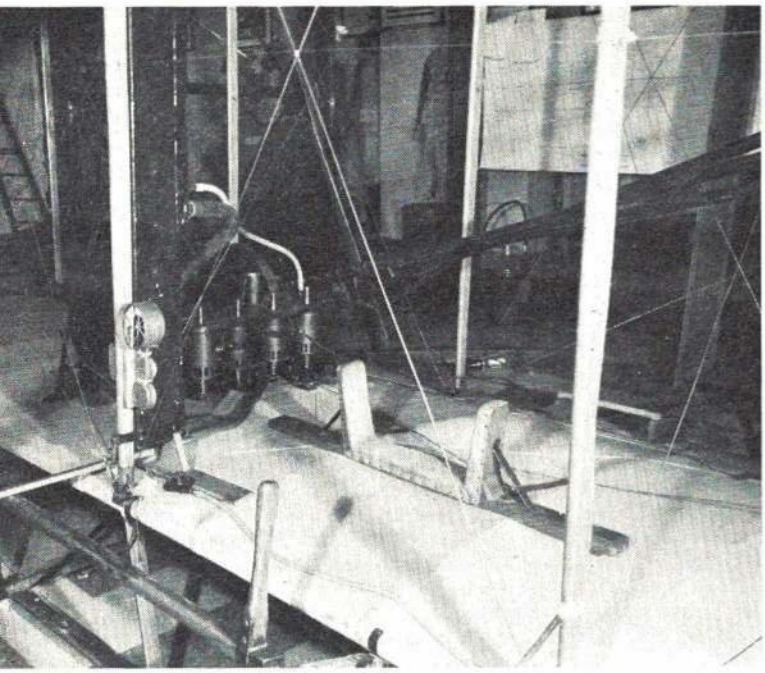
Propeller problems: The problem of designing a propeller or propellers — their plans called for two air screws turning in opposite directions to offset torque — became far more complex than they had anticipated. Orville once put it this way — "With the machine moving forward, the air flowing backward over its wings, the propellers spinning sidewise, and everything moving at the same time, we didn't really know where to start!"

They began, as they did when faced with the problem of wing design, by researching every possible source at the library for knowledge about propellers. Mostly what they found in published data pertained to marine propellers. There was very little about "air screws." Orville remarked one time that he was quite surprised that the others who had tried mechanical flight had made such little reference in their published data to the design of propellers. He said — "This led us to believe that they simply had turned to the data on marine propellers and applied this to their propeller designs for their flying machines.

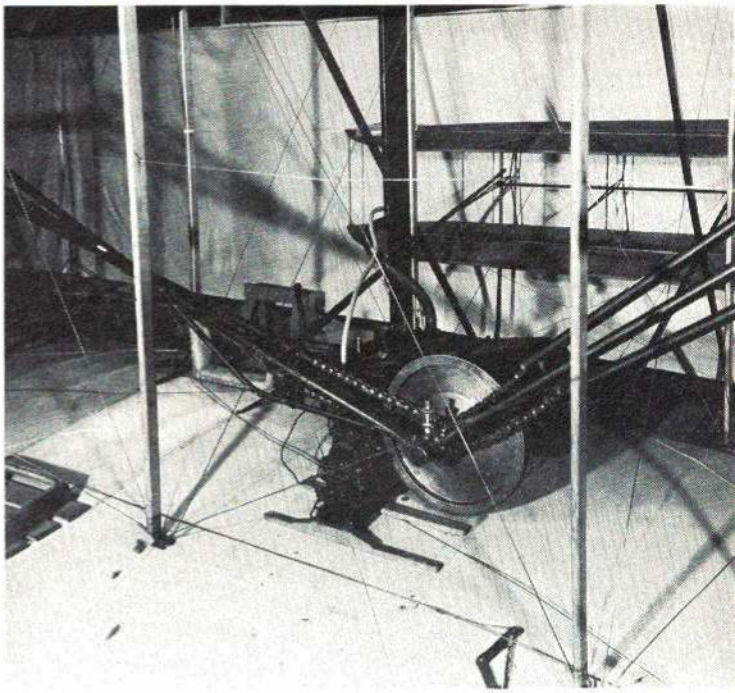
"And the truth is," he added, "we could find very little useful data about marine propellers." This, perhaps, was the turning point in their thinking about the propulsive force for their power flyer. It may well have been, their secret of success. Another key.

We were talking one day in his laboratory about their small wind tunnel (the "magic wind box") and Orville explained that their tests with airfoils, which gave them so much gliding success, also were the answer to their propeller problem.

I'll never forget his explanation: "We forgot all about what we learned about marine propellers and started thinking about the aerial propeller as simply a revolving airfoil . . . Wilbur called it a *horizontal lift device*, similar to the idea of Penaud's little toy, and we began thinking in terms of *thrust* and *lift* being the same forces whether in a vertical or horizontal plane. . ."



The four-cylinder engine designed by the Wrights, was built by bicycle-mechanic Charley Taylor. Saddle and foot rest were designed for prone pilot who operated elevator lever with left hand, throttle with right. On that December 17 day in 1903, four flights were made, one for more than 850 feet.



Crankshaft was connected to propellers with sprockets and bicycle chains. The chains ran through tubular casings; were crossed to cause propellers to turn in opposite directions. Fifth flight aimed at several miles, but gust smashed plane while at rest.

The rest was simple applied science. They used their own data on air pressures and wing configuration (airfoils) in shaping the propeller blades and their angle of biting the air, to design an efficient propeller.

When they had finished their aerodynamic studies of propellers (revolving airfoils) they had more knowledge on the subject than any of the other experimentors.

The proof came on December 17, 1903 at Kitty Hawk.

The power flyer: Orville almost always referred to the first successful airplane as "the power flyer," perhaps, because he regarded it as a larger version of the 1902 glider fitted with its own power plant to "manufacture its own wind for lift." The machine had a wing span of 40 feet, eight inches, with a chord of six feet, six inches, about the same aspect ratio as the 1902 glider. A biplane, its wings were six feet apart, supported by numerous struts and wire trussing. It rested on sled-like runners, bent into straight uprights in the front to support the forward biplane elevators. They changed the vertical vanes (rudders) in the tail back to the dual arrangement of their first 1902 glider, with movable surfaces. The framework construction was spruce, with all plane surfaces covered with broadcloth.

The engine was mounted on the lower wing just to the right of center. To balance the weight of the engine, the operator's position, a cradle-like arrangement, was on the left of the centerline. The engine crankshaft was connected to the propellers by a system of sprockets and bicycle chains. The chains ran through tubular casings to keep them from "flapping" and were crossed to cause the propellers to turn in opposite directions.

Twin pusher propellers were mounted on long shafts extending rearward so that the propeller arc could clear the trailing edge of the wings. Orville once explained to me that they had decided on pushers because "we thought the propellers churning up the air in front would distort the flow of air over the wings and upset our air pressure tables regarding lift." He also pointed out that the weight of the propellers and their shafts, they felt, would better balance the machine vertically — "like a teeter-totter on its fulcrum." Another thing he said was that the airfoil section of the propeller blades was "very close" to that of the wing camber. *Thrust* and *lift*, they were convinced belonged in the same family.

"The Wrights," someone once remarked, "were certainly the world's first true aerodynamicists."

Truer words were never spoken. The power flyer was a scientific experiment in the shape of wings and properly applied mechanical energy.

The machine was not ready for shipment to Kitty Hawk until mid-September of 1903. The engine, propellers and the air frame and wings had been under construction since early spring. It was during this period, Orville admitted, that they changed their whole thinking about their work. By his own admission, he more or less verified the fact that they, themselves, believed they had indeed discovered a new science. They were both convinced that the power flyer, because of their accumulated know-how, could and would, achieve successful, sustained, controlled, mechanical flight with an operator aboard.

"At this point," Orville said, "we began talking about a practical vehicle of the air, and we were beginning to think of flying as something much more than just the sport of gliding. We often talked of a flying machine that would become a new form of transportation, and every indication we got from our tests in the laboratory spurred us to drop everything else . . . We were almost certain success was within our grasp, and we wanted to complete that which we had started."

This probably was the driving force that made them men of destiny. It was a characteristic both had from early childhood. Their word was honor. Their theories and claims disproved would have tarnished it. They had to fly.

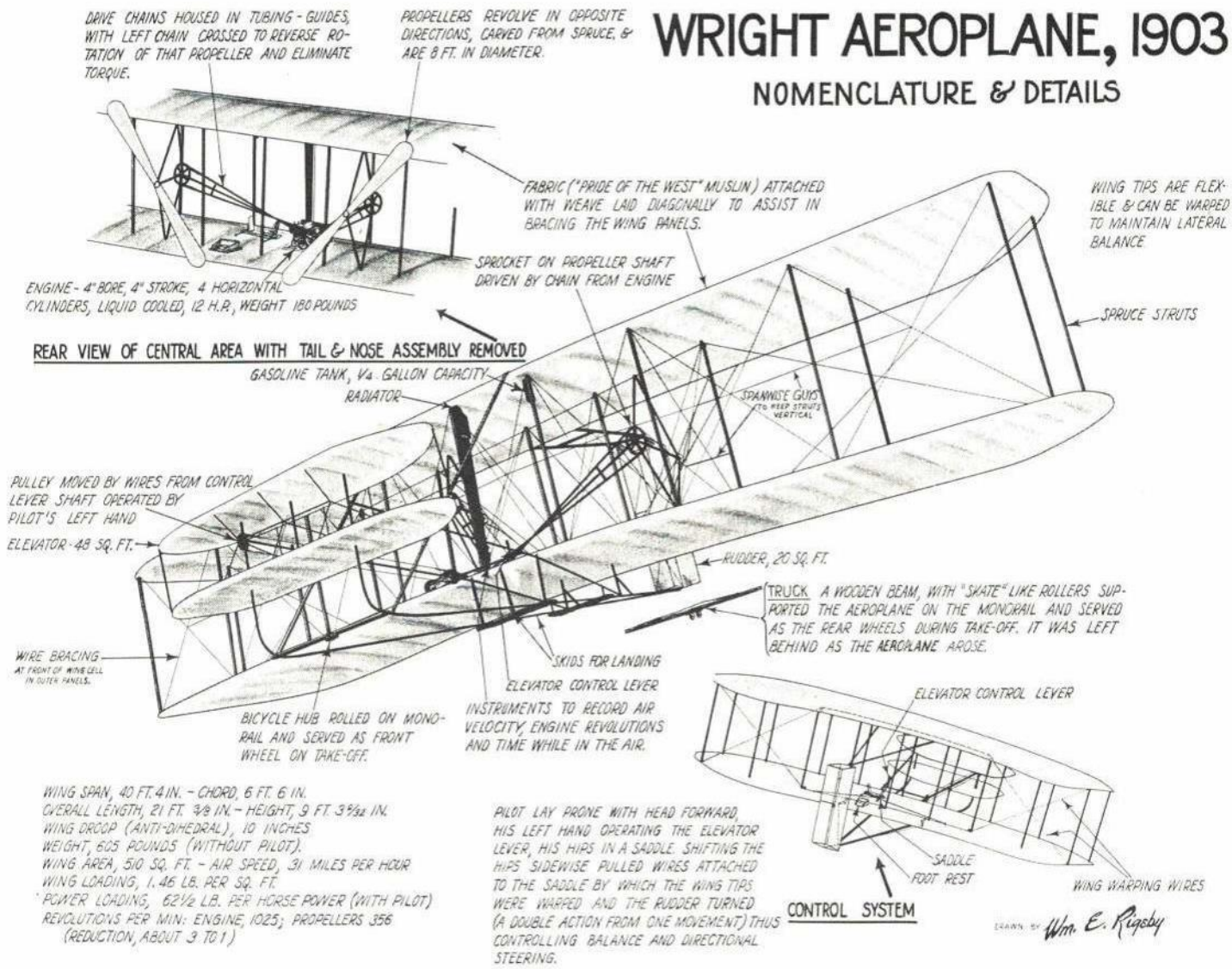
I remember one time I asked Orville — "Didn't you think that success would make you a millionaire?" It was a wrong question and brought displeasure in his expression. They were businessmen, he pointed out, successful in a small way with the bicycle business, and they would like to get back their investment — "about $2500 all told in the gliders and the power flyer including labor and materials." (Probably not counting their own time.) "At one time," he said, after their success, they "thought ten-thousand dollars would be a satisfactory figure for the invention."

The fact is, they offered their invention to the U. S. for free. This, knowing that the government had given Langley $50,000 for his experiments!

Strangely enough, when he died Orville Wright was *not* a millionaire. His estate was less than a million dollars. Yet they had given the world a priceless heritage — the wings of the eagle.

The wings were assembled at Kitty Hawk during October and November of 1903. They were not ready to be tested until Monday, December 14, when they flipped a coin to see who would be the first man to fly. Wilbur won.

He took his place, lying prone on the



wing of the machine which rested on a monorail track, a launching method the Wrights had devised to help keep the machine straight into the wind. It consisted of about 60 feet of track, (two by fours) laid on their narrow edge with a thin metal strip on top, the machine resting on a dolly-like arrangement with ball-bearing rollers. The engine was started, the propellers given a twist, and the crucial test was underway. It took wing, and Wilbur was unquestionably the first to fly in a power-driven machine, but the result was far from satisfactory.

Orville described it this way: "The machine climbed a few feet into the air off the rail, then it stalled, and settled to earth about a hundred feet beyond. But it didn't really prove anything — it landed at a point lower in elevation than that from which it had started — proving little more than that we had glided down the hill with a heavier glider."

Air time was a little more than three seconds. And the machine was damaged slightly in the landing. "We were satisfied with only one thing," Orville confessed. "The launching method was safe and practical." It took three days to repair the machine and make ready for the next attempt.

Day of destiny: John T. Daniels, who ran the U. S. Coast Guard Kill Devil Life Saving Station, looked out the tower window on this particular morning, and little did he know that he was peeking over history's shoulder. What he saw was a stretch of desolate, isolated beach and the Wrights' camp. Then, his eyes spotted the signal — a piece of cloth streaming from atop the old shed where the "birdmen" were making their experiments. Daniels knew what it meant. Wilbur and Orville were about to try again their new-fangled flying contraption, which they had told him would fly through the air under its own power and carry a man aloft.

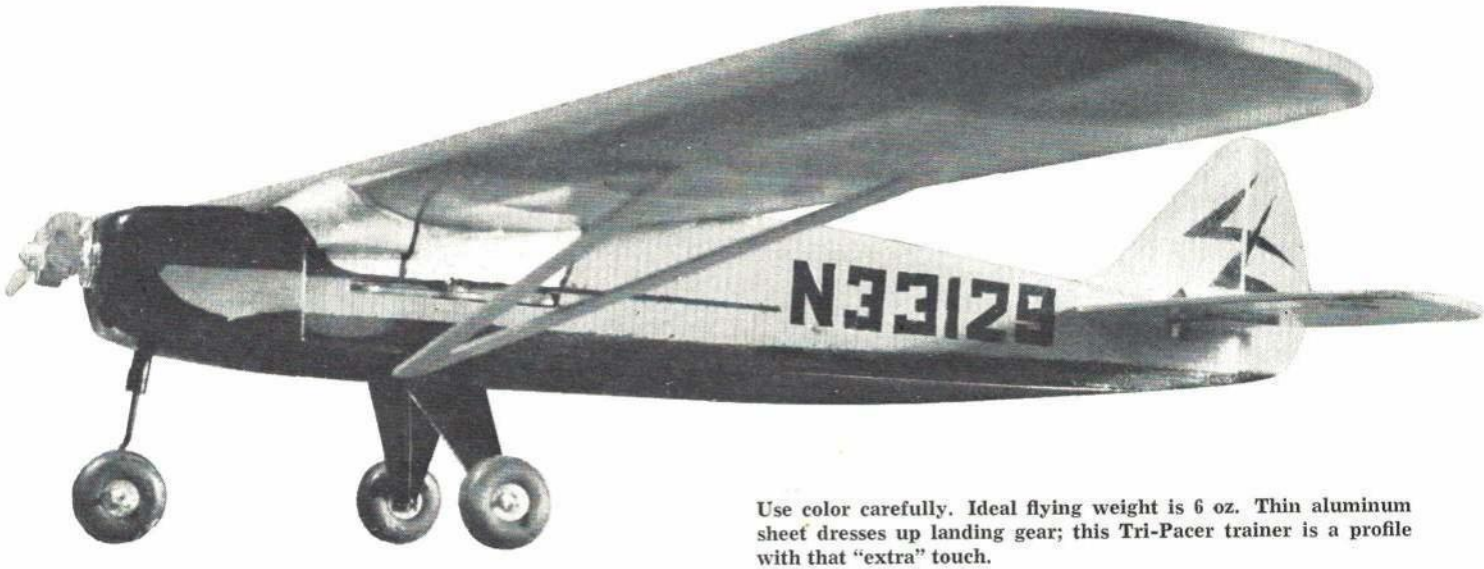
Ridiculous? Daniels wasn't sure. He had seen some strange things happen during the past two years since the Wright Brothers had made camp on the lonely site a few hundred yards from the life-saving station. At first, there had been those giant kites big enough to support a man. Then, it was the gliders. Now, it was this larger craft with its skeleton frame, the broadcloth-covered wings, and the maze of struts and wires. And it had a motor, the most polished powerplant he had ever seen, with a husky roar that silenced even the wind. The motor drove two huge fan-like propellers mounted on shafts between the upper and lower wings. Come to think of it, Daniels had to admit, the thing looked like a flying machine.

When he saw the signal, Daniels decided to go down to the camp. As he walked, Daniels noted the wind velocity was about 27 mph! It was almost a gale blowing. He reasoned that no one would be crazy enough to brave such gusts in so frail a machine. But the Wrights were unpredictable.

Arriving at the campsite, Daniels saw the craft was already in position on its launching rail. Orville was going to fly this time. His lithe frame (five feet, eight inches tall, 145 pounds) was stretched prone, head first, on the bottom wing to the left of the motor. He wore a strange, harness-like affair around his body at the chest and shoulders. The harness was tied to the wing tips by long, flexible cables. By twisting his shoulders, the operator could warp the wings, changing the angle at which the wind would strike them. With his hands, the operator could control the throttle of the motor and, manipulating a stick-like control, he could change the angle of the forward elevator, up or down. His feet controlled the rudder, right or left. Daniels had seen them practicing and he had marveled at the coordination, the unnerved precision with which both the Wrights adapted to their unique control system.

Then, Daniels noticed that the

Continued on page 56



Use color carefully. Ideal flying weight is 6 oz. Thin aluminum sheet dresses up landing gear; this Tri-Pacer trainer is a profile with that "extra" touch.

Tri-Pacer Trainer

A control-line trainer, semi-scaled from Piper's popular Tri-Pacer, employs the Cox QZ 049 to keep the peace . . . and quiet.

HAROLD L. PRICE

TOWARD the end of 1952 Piper Aircraft introduced the new and immediately successful Tri-Pacer. It soon proved itself an outstanding aircraft and modification and production continued till about 1960. Its performance as a four-place personal plane was years ahead of its competitors.

In my version the new Quiet Zone motor was chosen for power. This engine was the first effort at an efficient muffler design. We wanted to see for ourselves just how much guts a QZ 049 has. It is widely used in ready-to-fly models. The problem of the plastic-die injection-mold model—the way they are made—is gravity. Gravity has been the cause of 99% of the destruction of these models. Less weight would help. A really strong but light-weight super-trainer is a good description of my Tri-Pacer.

No changes were made in the motor to increase its performance. The only breakin we gave it was four tankfulls in the plane to get a needle-valve setting.

The first flights were made at my sister-in-law's house in south Jersey. Her son and his pal were both experienced with the plastic 049 jobs, but neither had ever flown a balsa job. We took the first flight and tried a few loops, flew inverted half a lap, and did a horizontal eight to see how the plane behaved. After my test flight I turned the model over to the boys and stood in the middle of the circle

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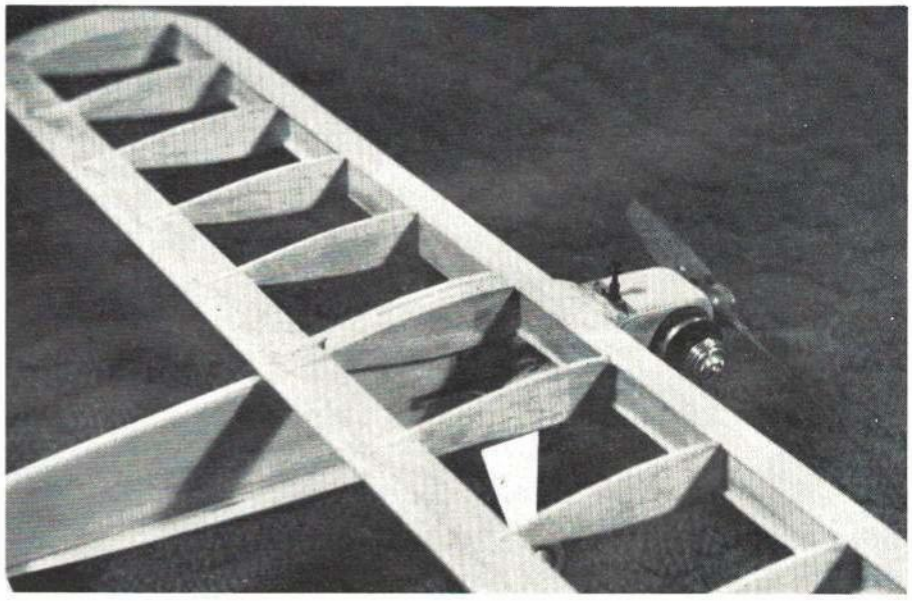
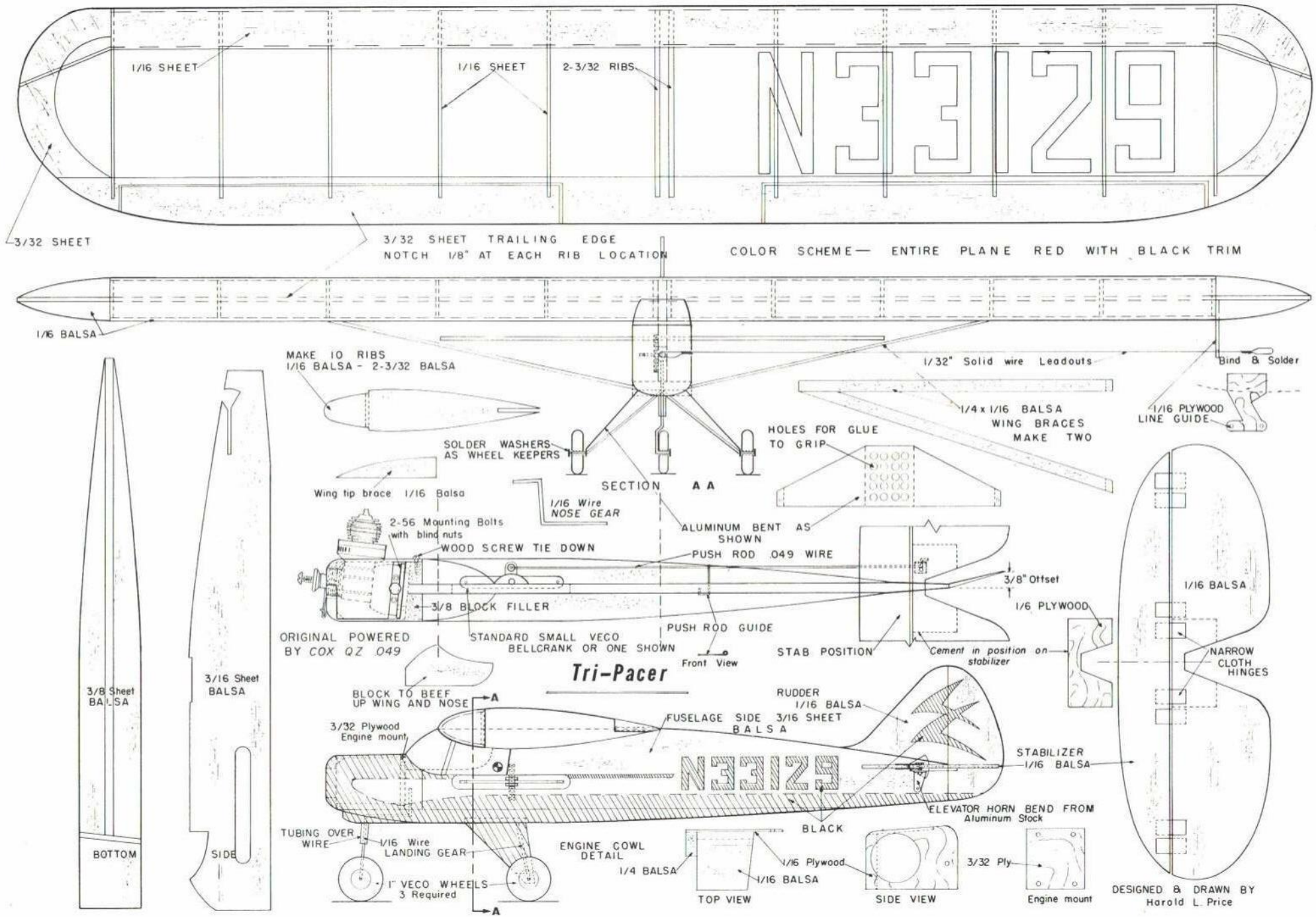
Terry, author's daughter, was one of the test pilots. Quiet QZ 049 gave her confidence. Helping launch the trainer, she soon moved into the circle's center.



Nearly unbreakable, the trainer's wing has a D-section leading edge and a trailing edge set into husky ribs. The fuselage cross section resembles an inverted "T."


1/16 SHEET
1/16 SHEET
2-3/32 RIBS
N33129
3/32 SHEET
3/32 SHEET TRAILING EDGE
NOTCH 1/8" AT EACH RIB LOCATION
COLOR SCHEME— ENTIRE PLANE RED WITH BLACK TRIM
1/16 BALSA
MAKE 10 RIBS
1/16 BALSA - 2-3/32 BALSA
1/32" Solid wire Leadouts
Bind & Solder
1/4 x 1/16 BALSA
WING BRACES
MAKE TWO
1/16 PLYWOOD
LINE GUIDE
SOLDER WASHERS
AS WHEEL KEEPERS
HOLES FOR GLUE
TO GRIP
Wing tip brace 1/16 Balsa
SECTION A A
1/16 Wire
NOSE GEAR
2-56 Mounting Bolts
with blind nuts
WOOD SCREW TIE DOWN
ALUMINUM BENT AS
SHOWN
PUSH ROD .049 WIRE
3/8" Offset
3/8 BLOCK FILLER
1/6 PLYWOOD
ORIGINAL POWERED
BY COX QZ 049
STANDARD SMALL VECO
BELLCRANK OR ONE SHOWN
PUSH ROD GUIDE
Front View
STAB POSITION
Cement in position on
stabilizer
1/16 BALSA
NARROW
CLOTH
HINGES
3/8 Sheet
BALSA
3/16 Sheet
BALSA
Tri-Pacer
BLOCK TO BEEF
UP WING AND NOSE
RUDDER
1/16 BALSA
FUSELAGE SIDE 3/16 SHEET
BALSA
3/32 Plywood
Engine mount
STABILIZER
1/16 BALSA
ELEVATOR HORN BEND FROM
Aluminum Stock
BLACK
TUBING OVER
WIRE
1/16 Wire
LANDING GEAR
ENGINE COWL
DETAIL
1" VECO WHEELS
3 Required
1/4 BALSA
1/16 Plywood
1/16 BALSA
3/32 Ply
TOP VIEW
SIDE VIEW
Engine mount
DESIGNED & DRAWN BY
Harold L. Price
BOTTOM
SIDE

Grumman F3F-3 by Monogram is a king-size kit (⅜″ equals 1′). Operating detail includes landing gear that retracts and lowers. Markings indicate this is a squadron commander's aircraft.

Grumman F3F-3 Navy Shipboard Fighter

JOHN N. TOWNSLEY

THE Grumman F3F-3 was the first of this series of aircraft used by the Navy. First delivery was made in 1936; before its use was discontinued, every Navy and Marine fighter squadron was equipped with the F3F.

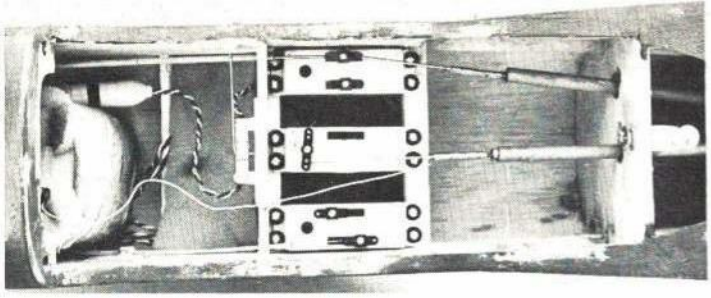
The kit used for the model shown is manufactured by Monogram Models, Inc. (Kit No. PA70) and retails for $1.98. The model is in ⅜″ equals 1′ scale, one of the first king-size kits. Molded in silver, red, yellow, and clear plastic, the kit has a highly detailed cockpit, simulated fabric-covered wings and tail surfaces, landing gear which lowers and retracts, sliding canopy, and movable control surfaces. Parts are flash-free and kit is well engineered.

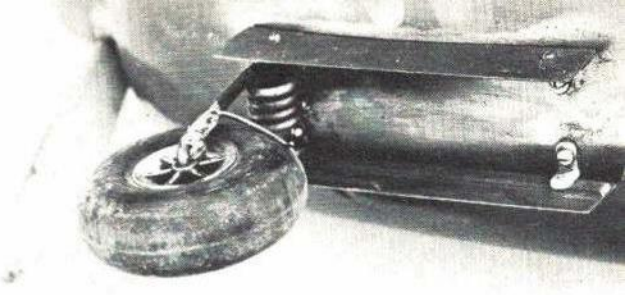
The F3F-3 was the last of the biplane fighters. With a speed of 264 mph it was, then, the fastest shipboard biplane fighter in the world. In addition, it was also the last of the colorful fighter planes once sported by the Navy and Marine Corps. Brilliant markings were used to identify these planes with the carriers and squadrons to which they belonged and their squadron position. After these planes were phased out, the Navy and Marine aircraft were uniformly painted in drab wartime colors. The red tail surfaces of the model, fresh out of the kit box, indicate it was attached to the USS Yorktown. Red cowling and fuselage band and figure "1" indicate squadron commander. Figure "5" indicates fighter squadron; "F" signifies fighter. The "V" on the upper wing aided wingmen in lining up while in Vee flight formation.

Fighting Squadron Four was attached to the carrier, USS Ranger. "F" means fighter; numeral one means squadron commander. The sliding canopy reveals a wealth of cockpit detail. Nicely done. Al Williams' Gulfhawk was quite similar.

Squadron colors: A typical squardon had six sections of three planes each; each section was colored in order listed below. Only section leaders carried a color band around the engine cowl and around the fuselage. The plane to the left of each section leader in flight had the upper half of the engine cowl colored; the plane to the right of each section leader had the lower half of engine cowl colored. Each plane carried the squadron number first, followed by "F" and then the individual plane number. The number revealed the position of the plane in the squadron. Thus, the section leaders were always numbered "1" - "4" - "7" - "10" - "13" or "16". All planes carried their numbers and a chevron of the section

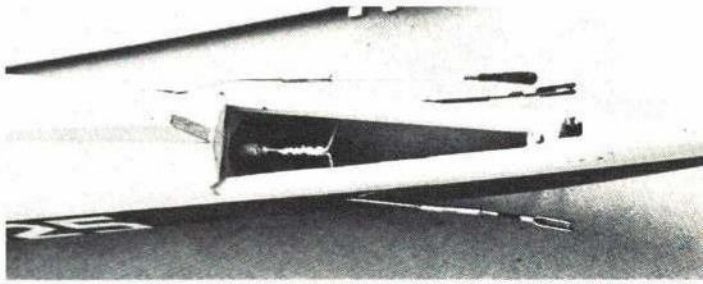
Continued on page 60





Room for anything in the cavernous fuselage. Kraft-Hayes servos shown here with interesting methods of connecting pushrods.

Upper right: Nose-wheel installation is made realistic by addition of doors. Steerable nose gear is a floor-mounted homemade unit.



Right: Twin elevator pushrods are used because of the swept forward hinge lines of the flippers. Empennage is mounted by dowel and nylon bolt system — also permits easier transportation.

Mooney/Mark 21

GERALD NELSON

Designed as a functional stunt model, our semi-scale R/C continues the trend towards realism. It has that "Looks-Like" appeal. Span is 70 in.

MY Mooney is a semi-scale stunt model which resembles a 1963 Mooney Mark 21. It is intended to be a stunt job first, a scale job second.

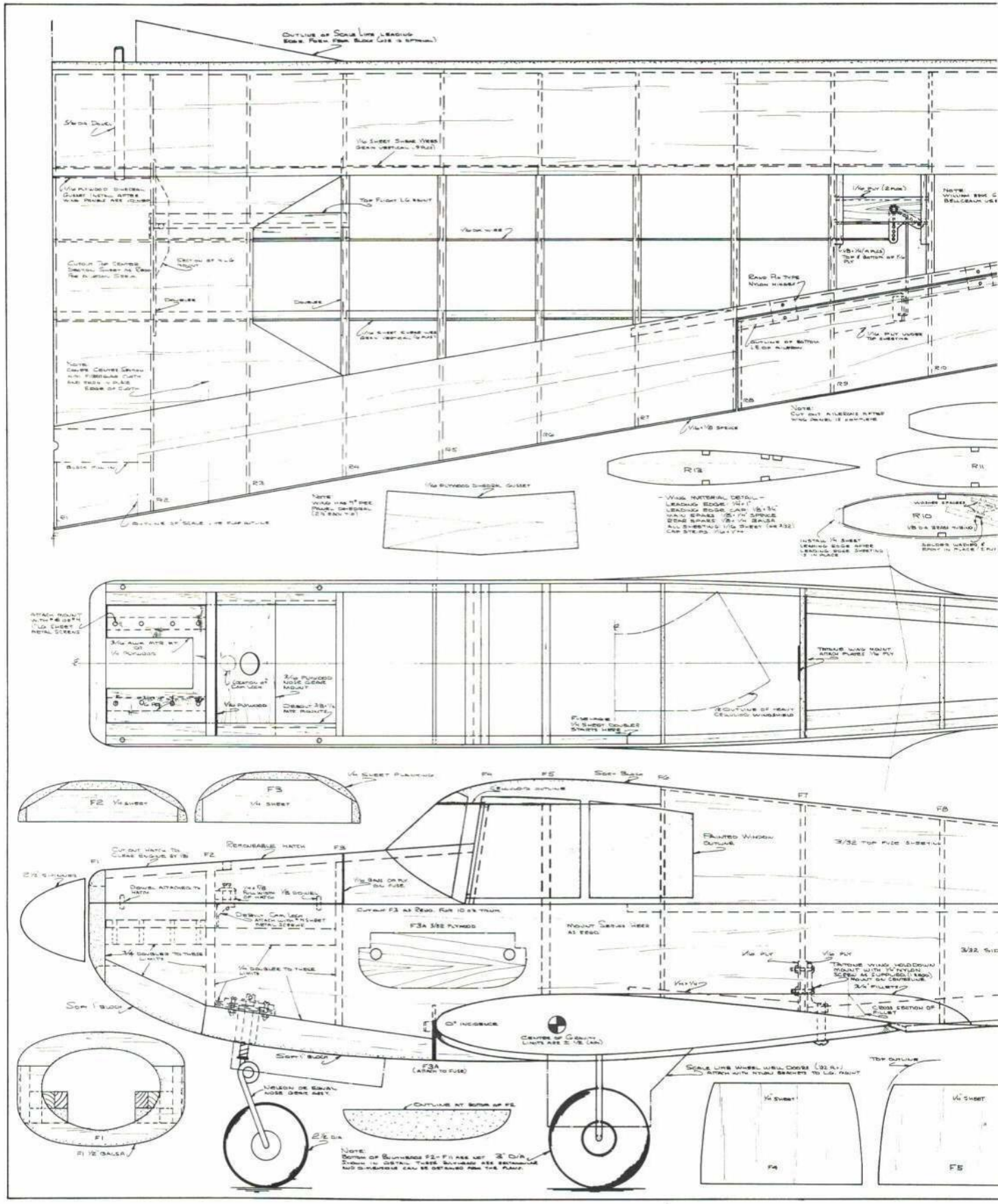
No major breakthrough in the state of the art has been made with this design. It is intended to be an interesting looking, functional stunt model using basic construction techniques and materials. Regarding the semi-scale aspect of this ship, several excellent articles have been written lately noting the trend towards realism in stunt models. This trend is gaining momentum and I am pleased to see this happen. One of the purposes of Mooney design is to encourage and promote this trend.

The original, classic stunt job theme (Kwik-Fli, Taurus, etc.) will be with us for some time. This type of model flies excellently, is easy to build, and has an excellent contest record. However, there are flyers who are looking for something different. They want a design that they can identify with a full-scale aircraft.

R/C models are tending to become miniature aircraft, and not toys. To help the image of R/C model airplane flying as a sport, realistic-looking designs are needed instead of our standard "toy airplanes." Take a design like the Mooney to a flying session and watch the spectators group around the ship. They may or may not recognize it as a Mooney light aircraft, but they will recognize the fact that it looks like a miniature light aircraft. When you fly the ship all eyes are watching its progress in the air. After the first flight, the flyers of the unrealistic ships can be seen comparing their stereotyped jobs to the Mooney. They usually go home saying something to the effect, "Maybe I should build something like that Mooney."

You are not at a competitive disadvan-

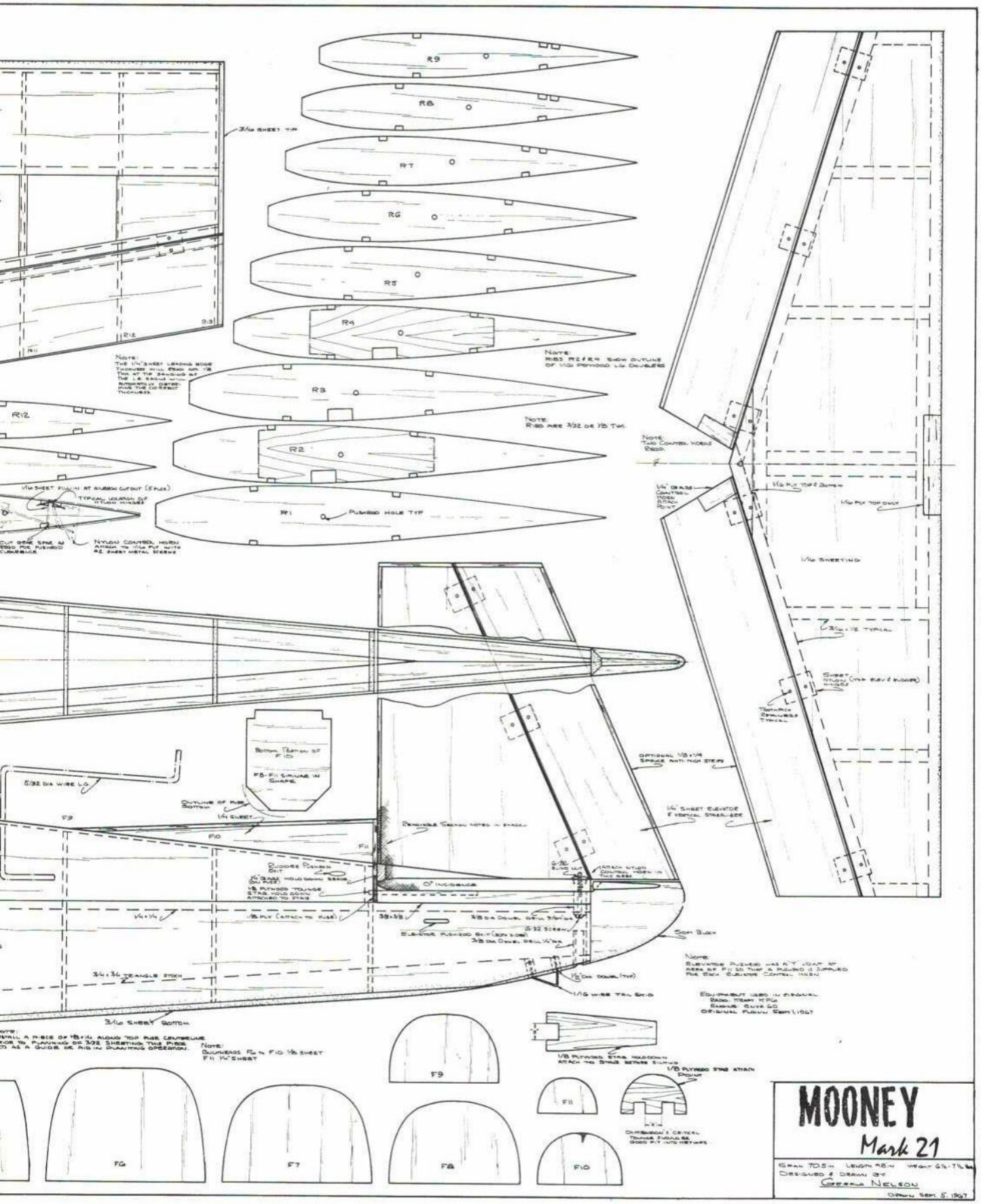
To keep light wing loading for aerobatics, the sharply tapered wings have long span. Airfoil is fully symmetrical which minimizes attitude changes with power variations.



tage with this design. It will do all the new 1968 AMA maneuvers, plus a few other maneuvers that might come into effect in 1969. The list of 1968 maneuvers will probably grow. The Mooney has the requirements for the future maneuvers.

The only disadvantage of the Mooney's design is a little extra work in building the fuselage. There are a few extra deals, like the hatch, rounded fuselage top, wheel-well doors, and a scale-like paint job. When you think about it, the extra work isn't very much.

The almost scale fuselage width will allow any kind of radio to be installed with room left over. There is also ample room for a retractable landing gear system, if you want one.



The wing span is somewhat large by current standards (70"). It is highly tapered, which brings the wing area down to normal areas. The airfoil is a relatively thin, symmetrical section. This section is advantageous for the flying performance we now require. The ship flies at a good speed, and can slide through the maneuvers instead of being pulled through them by brute force. The section also provides an excellent glide path by forcing the

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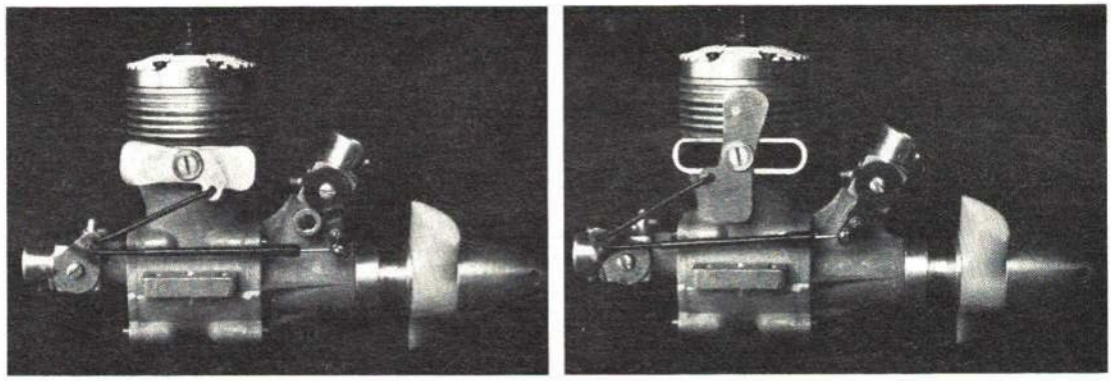
FULL SIZE PLANS AVAILABLE
SEE PAGE 60



Dual carbs on a K&B 40. Linkage is uncomplicated and easy to construct. At left, carb venturis are closed; both venturis are full open at right. Motor control servo links with front carburetor's throttle arm.

DOUBLE-BARRELED APPROACH INCREASES ENGINE OUTPUT

Dual-Carb Power

One carb provides low-speed performance and idle. The second "cuts in" at mid-range. Extra venturi area and fuel increase output nearly 30%!

HAROLD deBOLT

HAVE you ever considered the thinking that goes into the design of a new engine? Engines are extremely expensive to tool for production so, obviously, you do not tool, unless you have something really exceptional. Basic design is quite complicated and critical. Things must be just right or performance suffers.

Far less information on engine design and operation is available, than for other things we use. The engines offered today are excellent products in terms of power and wear, and most have usable idle. So continuing refinement is the only reason to look for something different, or better. There is such a need now!

Whereas the trend is toward smaller R/C gear and models, the recent trend in engines is to ever larger sizes — both in displacement and physical size. Better that the engines also would become smaller and lighter. If the manufacturers could add power at the same time decreasing size we would have lots of good things to experiment with!

Now that we have rpm and power, the problem is to get rid of the rpm when idle is called for. In nearly every event this problem has boiled down to carburetion. The engine is capable of idling, provided the cylinder gets the correct amount, and proper portion of fuel-air mixture to suit the rpm desired. Many different carburetor designs and methods have been used to do this — some quite successful. The most nasty carburetor problem is the differential in engine vacuum, or fuel-drawing power, between high and low speed. Maximum drawing

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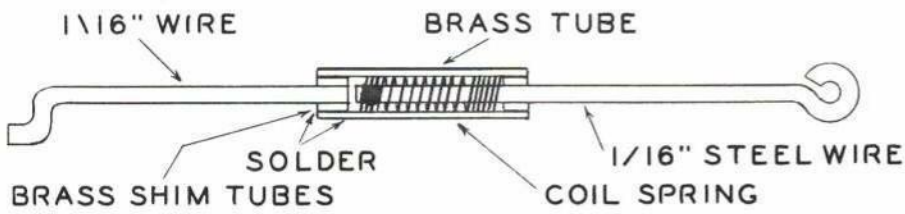
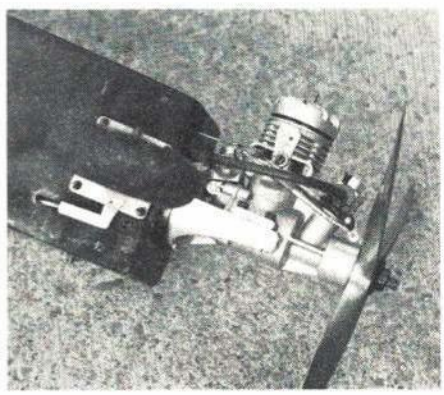
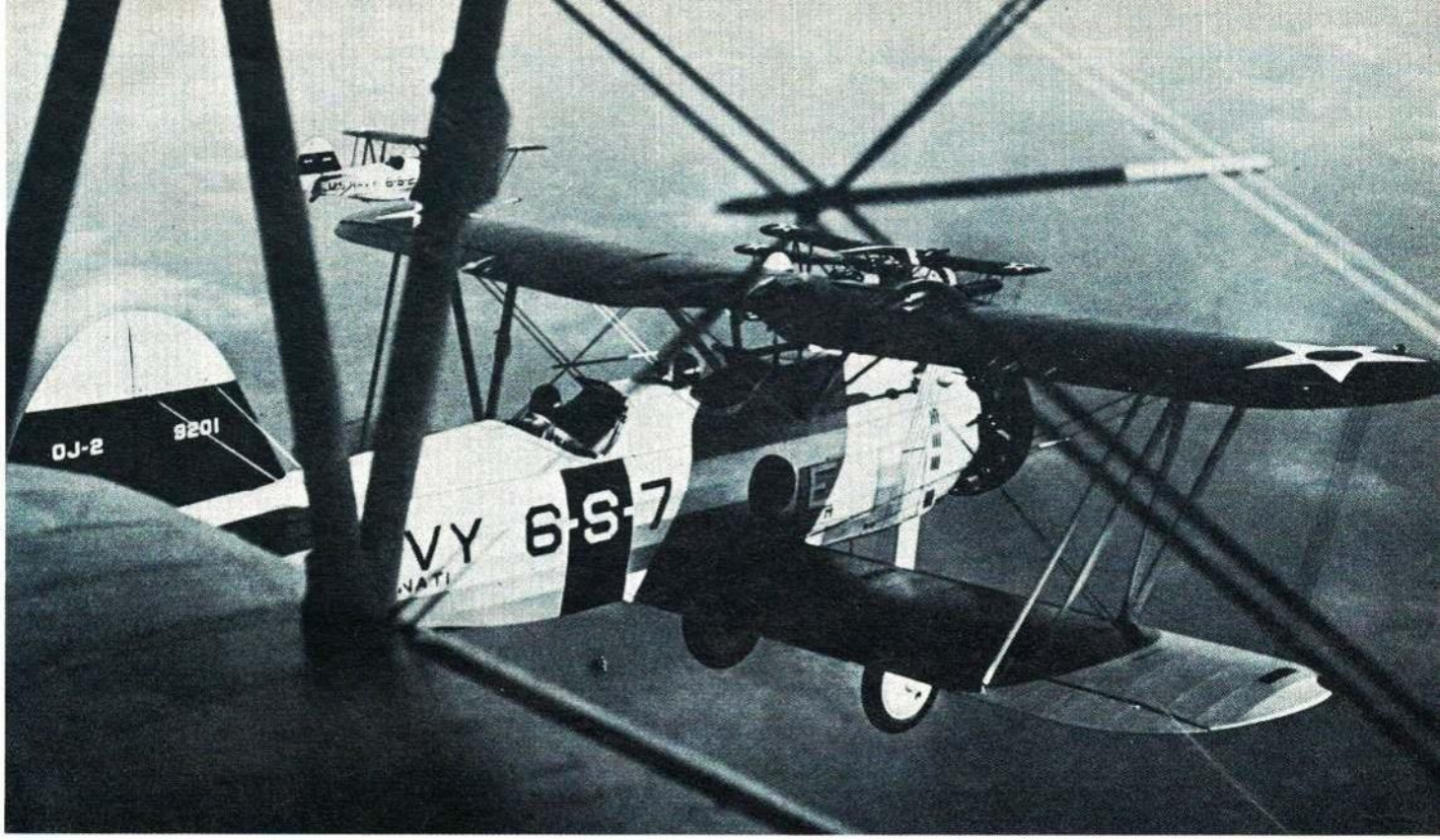


"OVER-RIDE" TYPE PUSHROD

Ability and looks — P-51 is a kit "in-the-works." Dual-Carb K&B 40 in a 4 lb., 14 oz. flying machine. Span is 56 in., area of 620 sq. in. and speed — 100 mph plus.



A Dual-Carb ST 46 was flown in a test-bed Jenny. Vertical type of rear intake offers no problems. Prop is a three-blade, Tornado 10-6 (diameter and pitch) Nylon.



Cruiser Division 3's OJ-2s fly formation. Each cruiser, USS Cincinnati, Detroit and Milwaukee, had two VS-6B aircraft assigned from 1933 to '35. Tail stripes are red on 6-S-7; nose cowl, fuselage band and wing chevron are black. Identification was stressed.

The BERLINER-JOYCE OJ-2

Called the hard luck company, the B/J Corp. struck out three times with the Navy. But the fourth time up, they scored a resounding success.

PAUL R. MATT

THERE were a great many consolidations and mergers in the aircraft business during the late 1920's and early '30's. Large financial interests became more aware of the growing aviation industry. Where there is growth, there is prosperity, money and profits. In some cases this entry of big business had an adverse effect, in others it provided the needed financial backing for a struggling firm to succeed where it might have failed because of the fast-changing times. One of these large concerns was North American Aviation, Inc., which incorporated under the laws of Delaware on Dec. 6, 1928 for the purpose of buying, selling and trading in securities and stocks of aviation companies. One firm purchased was the original Berliner-Joyce Corp.

The Berliner-Joyce Aircraft Corp., with main offices in the Hearst Power

This is the second of the two OJ-2s of VS-6B from the four-stack cruiser, USS Concord. Large letter "E" with the small "M" underneath was the symbol for Excellence in Machine Gunnery.

GENERAL SPECIFICATIONS
LANDPLANE VERSION

WEIGHT EMPTY	3104 lbs.
USEFUL LOAD	525 lbs.
GROSS WEIGHT	3629 lbs.
TOP SPEED	142 m.p.h.
CRUISING SPEED	118 m.p.h.
LANDING SPEED	58 m.p.h.
CRUISE RANGE	400 miles
SERVICE CEILING	14,200 feet

POWER - PRATT & WHITNEY R-985-A
400/420 h.p. WASP Jr.

COLORING NOTES

ALL FABRIC AREAS - SILVER
METAL AREAS - LIGHT GRAY
TOP SURFACE, UPPER WING ONLY,- CHROME YELLOW
ENGINE COWL, NOSE PLATE, WING CHEVRON, EMPANNAGE STRIPES, FUSELAGE BAND - RED
LETTERING ON FIN & RUDDER - WHITE
6, I, U.S. NAVY & CONCORD ON FUSELAGE - BLACK
- S - ON FUSELAGE - WHITE

13' 2"
24"
21½"
31½"
CLEAR FORMATION LIGHT
NAVIGATION LIGHT
MACHINE GUN RETAINING CLIP
BAGGAGE COMPARTMENT
HAND HOLD
HORSESHOE GUN MOUNT
SHORT INDIVIDUAL BAYONET EXHAUST STACKS
30 cal. FREE FIRE COLT BROWNING
FIVE-STRING "BANJO" ANTENNA
BOMB MOUNT ACCESS
FEET 0 1 2 3 4 5 6
METERS 0 1 2
7'6"
7'6"
ALUM. PANELS
STEP BAR
58"
13"
16"
28"
58"
28" STAGGER
9"
NAV. LIGHT
58"
9"
28"
0° INC.
EXACT AIRFOIL UNKNOWN PORTRAYED PROJECTED FROM PHOTOGRAPHS & SUITABLE FOR SCALE MODELING
ALUMINUM LEADING EDGE
SERVICE STEP
(X) FIXED HOISTING SLING
FUEL ACCESS
INERTIA STARTER FITTING

B/J Corp. OJ-2
DRAWN BY- PAUL R. MATT
from the files of
HISTORICAL AVIATION ALBUM
for
AMERICAN Aircraft MODELER
SCALE - ORIGINAL 1:24
1/68

DRAWING No. AM-48-A PLATE 1 of 2

33' 8"
10'0"
COLOR SEPARATION LINE
2½"
5 WIRE ANTENNA ALSO AT (Z)
PITOT ASSEMBLY
2½"
30' 4"
30×6.5 TIRES
ENGINE PLATE, RED, SLIDING COOLING VENTS SHOWN CLOSED. 6-S-1 OPERATED FOR SOME TIME WITH PLATE REMOVED & ENGINE CRANKCASE PAINTED RED
METERS 0 1 2
FEET 0 1 2 3 4 5 6
1½"
6'0"
25' 8"
"BLIND AS A BAT" INSIGNIA OF VS-5B & VS-6B BAT, "S", V, 6 - BLACK WINGS - YELLOW BACKGROUND DISC - VS-6B, ROYAL BLUE VS-5B, RED
NON STANDARD, NOTED ON 6-S-1 ONLY - RED YELLOW
LARGE WINDSHIELD USED DURING GUN OPERATIONS ONLY
ADJUSTABLE WINDSHIELD
38"
29"
8'0"
24"
STABILIZER IS ADJUSTABLE, PIVOTING ON FORWARD SPAR
5'7"
DATUM
6-S-1 U.S. NAVY CONCORD
FULL SWIVEL, CASTERED TAIL WHEEL, SOLID RUBBER TIRE OLEO SHOCK STRUT
HOOK FITTED ONLY WHEN OPERATING FROM CARRIER
WIND DEFLECTORS FOR FLARE TUBES (2)
DEPRESSED LOUVRES
20"
13½" Approx.
5'7"
HAMILTON STANDARD ADJUSTABLE PITCH PROPELLER
FLOTATION BAG COMPARTMENT

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DRAWING No. AM-48-A PLATE 2 of 2

Bldg., Baltimore, Md., was incorporated in 1929 as the successor to the Berliner Aircraft Corp. of Alexandria, Pa. President was W. W. Moss with Henry Berliner and Temple N. Joyce as Vice-Presidents.

In 1930, during reorganization and the purchase of the major stock by the North American holding company, Berliner left the firm. Henry Berliner, a pioneer in aviation, first came into prominence in 1922 when he successfully demonstrated his "vertical lift" aircraft to the U. S. Navy. This helicopter was surprisingly advanced in aerodynamics and design but the world wasn't ready to accept any form of rotary-winged aircraft. In order to retain their identity the new company formed as the B/J Corp., retaining the initials of the two founders. Temple Joyce remained with the new B/J Corp. and became president late in 1930 when W. W. Moss resigned. He then remained in this capacity until the firm was dissolved in 1934 and North American Aviation, Inc. actively engaged in the development and manufacturing of aircraft.

Dozens of promising designs were proposed by the B/J firm. Only five actually saw fruition. F. S. Hubbard was employed as Chief Engineer and W. H. Miller as his assistant. Hubbard remained with the company for about a year, and Miller succeeded him as Chief Engineer. Thus most of the B/J designs stem from the latter's ability. Entering the highly technical and demanding field of military fighter aircraft, B/J sought Navy contracts with the XFJ series, the XF2J and XF3J. All were rejected. Only with the Army Air Corps' P-16 and the Navy observation OJ-2 were they successful in obtaining a production contract.

In 1930 the U.S. Navy requested bids from the industry for a new, light-weight observation aircraft to replace the heavier, Vought 02U Corsair. BuAer Design No. 86 stipulated a convertible land/seaplane of conventional design, suitable for use on the new compressed-air-type catapults aboard light cruisers. Two companies gained contracts for one experimental machine each. The Keystone Aircraft Corp. produced the XOK-1 and the B/J Corp. the XOJ-1. Both machines employed the Wright 300-hp R-975A engine and in general appearance were very similar since both followed the BuAer design formula.

On January 1, 1931 the Keystone XOK-1 was turned over to the Navy at Anacostia for evaluation. The XOJ-1 followed within the week. The XOK was a pot-bellied, rather antiquated design that incorporated a forward trend by having a monocoque fuselage. Appearance was deceiving because it outperformed its competitor during initial trials.

The B/J XOJ-1 was of tubular metal construction throughout and fabric covered. It featured full-span Zap flaps in both upper and lower wings. These operated both as wing flaps for shorter landings and takeoffs and also independently as ailerons. This feature had certain aerodynamic advantages but was apparently too involved to justify itself.

Following initial trials at Anacostia and Dahlgren during January and February, both machines were returned to the contractors with a number of suggestions and modifications to be undertaken. When the aircraft were returned in April, the XOK had a new 400-hp Wright R-975C engine and the XOJ a 400-hp P&W R-985A Wasp Jr. Performances improved considerably and gross weights had been reduced nearly 100 lbs. The B/J abandoned the flaps and with other cleaning up showed a top speed of over 153 mph compared to its previous 128.9 mph. The Keystone gradually fell behind in the step-by-step process of evaluation, during the second round of tests.

Military contracts were slim during this time. U. S. Navy aviation fiscal appropriations for 1931/32 were $31,145,000, a decrease of $888,211 from the previous year. Funds were spent cautiously. The XOK and XOJ faced stiff odds. Decisions were carefully considered. Finally, on October 26, 1931, the choice was made; Contract 24280 was issued for 18 of the B/J machines to be designated OJ-2.

Ashore for a check-up is this ex-VS-6, OJ-2. Operations of these aircraft were equally divided between land and seaplane versions. Wide, red stripe on main float is prop danger line.

Eighteen OJ-2s were specially built for the Naval Reserves. Based at Anacostia, Naval Reserve Aviation Unit, Squadron 6, Aircraft One is symbolized by the designation 6N1.

The Navy's decision was correct. The little known or remembered OJ-2 became an extremely rugged and reliable aircraft, filling a number of valuable roles as late as 1941. The OJ-2 grossed 3629 lbs. as a landplane version, a weight savings of over 350 lbs. compared to the late Vought (02U-4) in a similar configuration. It also got 151.3 mph out of its 400-420 hp engine while the Vought was doing 137.8 mph on 450 hp.

OJ-2s were assigned fleet duty and placed aboard the light cruisers in 1933. Squadron VS-5B of Cruiser Division 2 was fully complemented by June of that year and VS-6B was assigned to Cruiser Division 3 during the same period. The OJ-2s served aboard the USS Cincinnati CL-6, Concord CL-10, Marblehead CL-12, Memphis CL-13 and Trenton CL-11, to name a few. Normal complement of observation planes aboard a light cruiser was two. B/Js served well on an active duty status between June 1932 and late

Continued on page 54

'At this early date it appears that some aspects of the new rules should be definitely worthwhile –

AS might be expected after a complete change in the R/C stunt competition rules, there is quite a ferment among the troops! Some confirmed comp flyers are quietly designing and testing new planes that will accomplish some of the new maneuvers better (for example, you will probably see quite a few new designs with greater fuselage side area — which might hold their altitude better while going through the Knife Edge flight, and might also help in the Slow Roll). Needless to say, the Class I and II advocates are pretty unhappy with the whole deal. While a few top Class I pilots could doubtless do pretty well in the new Class A, and likewise top Class II flyers might hold their own in Class B, it's quite likely that A and B will both soon be 100% full-house multi; matter of fact Classes I and II already were, in the 1967 season, except that the planes were limited to two and three servos respectively, per the previous rules.

Where does this leave the modeler who felt he couldn't afford full-house propo or $50 full-bore stunt engines? It appears right now that he is left out of competition — but then, he really hasn't had much of a chance the last couple of years. How many Galloping Ghost planes did you see in Class II, in the last couple of years — or escapement planes in Class I? No, the simple and low-cost equipment was pretty effectively ruled out of competition in the *last* big rules change, back in 1963.

Of course, most R/Cers today aspire to full-house multi propo — sooner or later. For many of them it has to be later — much later, due to the cost. One need only look at the growing array of "sub-multi" propo gear now marketed, to see how this field is expanding. It's available from the simplest GG rigs to those that operate feedback servos from single-channel, pulse-rate, pulse-width gear. And it's selling, as maker after maker widens the choice with new offerings. Some of this equipment should be quite capable of competition in Class A, or even B; however, we doubt very much it will be entered to any extent. The owners will continue to roar around the sky engaged in plain old sport flying, just as owners of most simpler types of equipment have for the past few years.

A wide range of opinions on the new rules has been found in the newsletters of various R/C clubs. For example, Editor Ronnie Alexander of Sharks Sparks (Shreveport Area RKS) — apparently a Class II addict — sounds rather bitter, but resigned. Noting that now a Class I or II plane could possibly compete in the new Classes A or B, he asks why should the flyer handicap himself this way. He might just as well build a plane with ailerons, even to fly in Class A, and be gaining skill with full-house controls for later advancement to Class B, or even C. Ron notes that you can expect the really top pilots to be in Class III or the new C — which is just the reason he has stayed in Class II up till now. And for those who don't like the new stunt rules there is always Scale.

RADIO CONTROL WORLD

A ROUNDUP OF LATEST NEWS

CONDUCTED BY HOWARD MC ENTEE

VARIETY IS THE SPICE OF LIFE

Ben's monster grows: Latest report from Ben Tarnofsky (942 Grou, St. Laurent, Que., Canada) shows that he has made considerable progress on his huge plane, though work on this was halted last season when Ben had to go overseas, as part of the

Lou Proctor's Nats winning show-stopper in R/C Scale event is perfectly magnificent Nieuport which flies and looks like a well-polished and preserved WW I veteran.

especially the mandatory progression provisions.'

On the other hand, Editor J. H. Perdue of the *Air-Foiler* (paper of the Coffee Air-Foilers MAC, Tullahoma, Tenn.) takes a dim view of the whole situation. This club encompasses modelers in all categories, and Jim is particularly apprehensive that the elimination of the builder-of-model rule in R/C stunt (and Pylon) competition will spill over and foul up model aviation as a whole — meaning UC and FF. Jim agrees that the old Class I and II planes, by virtue of their limited controls, were really tougher in some ways to fly to top competition honors than were the Class III planes with a full set of controls. But he voices the feeling that the multi hotshots simply don't want to be bothered with the flyer who can't afford the "solid gold expensive equipment," and apparently feels the rules are set up solely to suit the "pro" R/C competitors. Jim feels there should be a stunt competition class for the person who can't afford top grade multi equipment.

Of course, the new rules have provisions that should prevent the same top flyers from dominating either Class A or Class B. Under the old rules you were advanced to the Expert category if you gained three places (either 1st, 2nd or 3rd) in an AA or larger R/C meet. But you could still stay in your preferred class indefinitely. Trouble was, there just weren't enough entrants in Classes I and II at most meets to include a Novice-Expert split. Often, there weren't enough even to *have* these events. Thus, it ended up with pretty much top experts only, in I and II. And due to the hot competition in Class III, many would-be contestants just were afraid to enter. So the new setup, whereby a flyer is mandatorily shifted from A to B, or B to C after three firsts in either of the lower classes is a definite advance, for it will get the hotshots up into the higher brackets and leave room at the bottom for the less experienced.

Meanwhile, advocates of the old Classes I and II have their committees set up, to try and drum up interest — and competition — in these two events. At this writing, there is no word as to how they are doing. We heard reports they might try to schedule I and II events at the forthcoming Nats; such events would have to be unofficial and probably held in the evenings.

So — at this early date it appears that some aspects of the new rules should be definitely worthwhile — especially the mandatory progression provisions. We gather that there will be a Novice-Expert split *only* in Class C, with some possibility that A and B might be split into two categories each — Junior-Senior and Open — if enough contestants show up at the largest contests to make the latter split worthwhile. We *still* have no category to entice the flyer who just can't afford top multi equipment and the plane to go with it; judging from the trends since 1963, we'll *never* have such a category! (At least, not as long as the rules are made by multi hotshots!)

We haven't mentioned the new maneuvers in Class C, but from what comments we've heard, no one seems too unhappy over the new schedule. And quite a few top rate flyers were just plain tired of the old routine. Anyway, we've got a brand new season in front of us, with a brand new set of rules. Wonder what the concensus will be a year from now. . . .?

Canadian team, to the Free Flight World Championships. The wing is now finished, the tail surfaces nearly so, and a good start has been made on the fuselage. Main worry at the present is to get an engine. Ben has his heart set on a twin-cylinder mill, and since he can't locate any that are suitable, he expects to design and build his own.

Ben had been promised plans of the O&R twin, but they haven't been forthcoming. It's apparent that this is no rush job — Ben is doing it up **right**. He expects to put in some 25 hours sheeting the rudder and a few remaining parts of the stab. Thirty-five hours were spent in making a set of elevator hinges — they must truly be a work of art! Stab and rudder as seen in the photo weigh about 20 oz. total. Ben is now searching for a prop of about 32" diameter — he doesn't specify pitch.

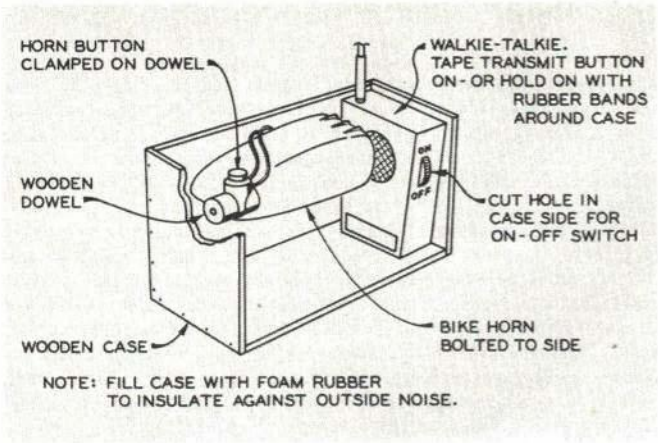
For those who didn't see our last report on this plane, the fuselage longerons are 5/8" sq. spruce; this wood is used for all uprights and diagonals on the half forward of the wing. The rear half will be entirely balsa. Formers and stringers will be added to the square structure you see here, to produce a nice fuselage contour. At last report, Ben guessed the completed wing weighed about 10 lbs., and that the entire plane should gross around 45 lbs.; this will give a wing loading of only around 14 oz. sq. ft.

'Useful' model planes: We like to feel that all the research and technical knowhow that goes into model planes could be put to good use for more serious purposes, and have shown several examples in past issues where this has proven to be the case. Here is another, though we don't know if the plane has ever been used for its intended purpose — which was to carry two 5-lb. silver iodide flares to some 15,000' altitude, for cloud seeding purposes. A note on the plane in newsletter of the Rapid City (S. D.) Propbusters club impelled us to check with Editor Clark Besancon, who was deeply involved in this effort.

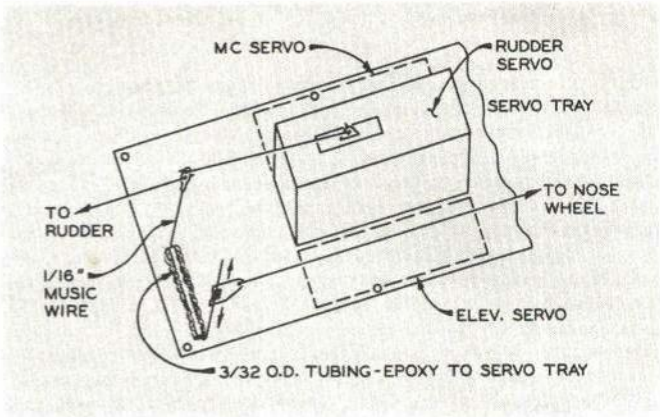
The Institute of Atmospheric Sciences (School of Mines) approached Clark to produce such a plane. After some negotiation, a design was drawn up by Capt. Jim Simpson, an R/C flyer stationed at Ellsworth AFB, and Clark did the building. The job took him only three weeks. Plane is covered with yellow MonoKote, has a 10' span and the tail booms (they run to the L. E. underneath the wing) are 1½ x 1" cross section, built of ¼" thick by 48" long balsa. A Merco 61 is on the nose, a Merco 49 at fuselage rear (latter used only because 10-6 pusher propo was the largest the builders could locate). F&M propo has been used, and the plane has made at least one flight over 35 minutes. Clark says that apparently the IAS has found work on such a project not as simple as they had hoped, though apparently the plane can do the job for which it was designed. Capt. Simpson did most of the flying, but it is not known who will fly for the IAS.

At McDonnell R/C meet, Harold Parreti displays his graceful multi-plane. Inverted and cowled engine with large control surfaces are features of this design.

An R and D model plane designed by the Propbusters Club, of Rapid City, S. D. is intended to carry cloud-seeding materials to 15,000 ft. for the Institute of Atmospheric Science. Two big engines and 10 ft. of wing.



Yes, this really works and the range is adequate. Use a cheap walkie-talkie modulated by a bicycle horn. Even the receiver half of the set might be used in the system.



James Watson's uncomplicated shock-absorbing and adjustable method of operating steerable nose wheel from the rudder servo. Linkage could be part of servo mounting board, transferable from plane to plane.

The fuselage is a sort of two-level job; the top half is occupied with a fuel tank at each end, and the throttle servo between. (Other servos, receiver and batteries in wing center area.) The entire under portion is left free to hold the flares. The plane was to drop the flares at the end of several feet of nylon cord, which would burn through and release the flares as they burned out; then, hopefully, the plane would be flown back to the takeoff point. Finished plane weighed 11 lbs. less the flares. Interesting note is that original stab (which was about 3' long) was flat, but there was a vibration problem, cured by going to symmetrical section. Due to rather thick wings, the ailerons are not very effective. An interesting and practical product of model R/C knowhow!

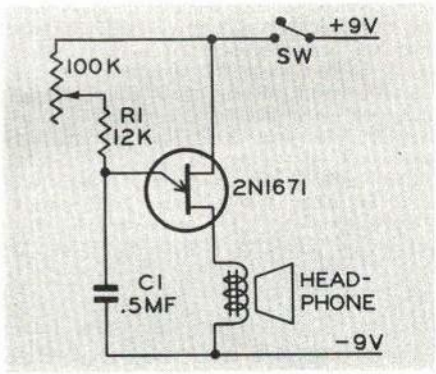
Info for visitors: As do quite a few R/C clubs, the Columbus (Ohio) Aero Club passes out an info sheet to visitors at their field. It includes a little data on the club, the planes and radio equipment, a few comments on field safety (including underlined note that C. B. radios and Walkie-Talkies are strictly verboten!). Under the heading "How Much?" are the lines: "A small single-channel plane might cost $75 to $100, while a large multi could be $600 to $800." Past issue of the club newsletter details awards made to various members for events of the past season. Most Interference Award went to Roscoe Drake — his Fairchild was hit and caused to crash while on final approach by an irate red-winged blackbird!

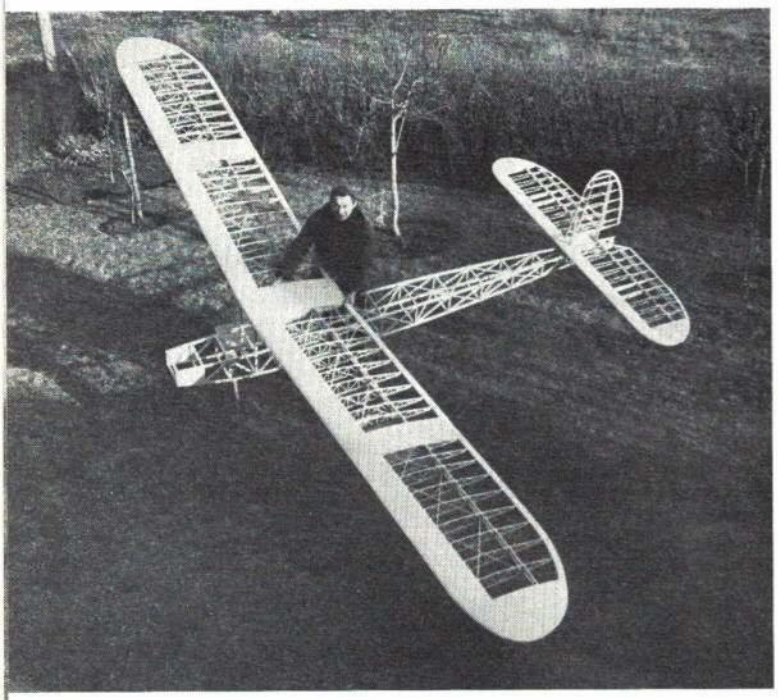
TECHNICAL MATTERS

R/C monitor? Where can he find a monitor capable of checking interference on the three main R/C bands (27, 50 and 72 Mhz), asks M. Costales (Alameda de Recaldo, 10, Bilbao-9, Spain). Wish we could tell him where to buy such a monitor, but we don't know of any at present. Small superhet converters are sold for amateur radio and other frequencies, need a regular BC receiver as the main portion of a receiver; they may be had for 27 and 50 Mhz bands, but not for 72. If you are interested in a converter for a single spot frequency, you can obtain crystal-controlled converters from several sources.

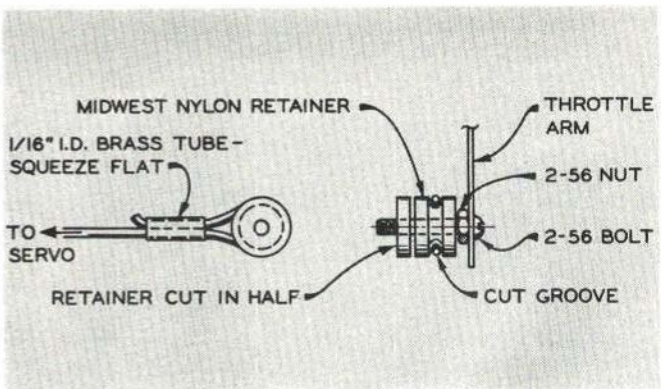
Petersen Radio Co. (2800 W. Broadway, Council Bluffs, Iowa) offers 2⅞ x 1⅞ x 4" plastic-cased two-transistor converters on any spot frequency you specify, for 27, 50 or 72 Mhz areas. These PRM units must be placed next to a working BC receiver (tuned to around 1000 Mhz) to pick up the desired signal. They cost $24.95 less battery — use a small 9V unit. For a bit more money, you can get the same units with a switch and two crystals. These converters are not tunable — they cover just the one (or in the double crystal version — two)

Continued on page 74





Method of determining engine rpm uses simple uni-junction audio generator. Match the tone and engine frequency and read off the corresponding rpm on a dial.



Clever way to connect stranded cable to the throttle arm using nylon bushings. Noiseless and inexpensive. Tim Brown.

Tarnofsky's monster is still taking shape! And he is still looking for a suitable two-cylinder motor. Plane will gross 45 lbs. but wing loading is to be only 14 oz./sq.ft.

A flying bandanna

Thumbtack and a Dab of Glue

Relax! Unravel and unwind. Anyone with a pinked-edge bandanna is a sissy.

KEN WILLARD

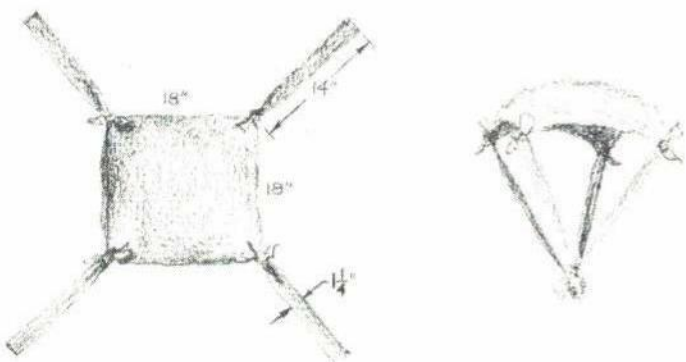
WORRIED about warps? Depressed by dihedral? Concerned about clobbering umpteen hours work in one crunching crash?

Forget it for a few minutes. Make yourself a flying machine that trims itself out in the climb, flies as high as you want it to, and when the engine quits, has an automatic recovery system which blossoms into a parachute for a soft landing.

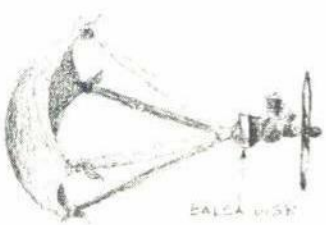
That's not all. Only takes ten minutes to make, and its a built-in wiping rag for your hands after each flight! Make a "Flying Bandanna," amaze your friends.

Here's the bill of materials: 1) One 010 engine by Cox; 2) One handkerchief — or any light rag, 18" square; 3) Four strips of cloth, 14" long, 1¼" wide; 4) One disk of medium hard balsa, ⅜" thick, 1" in diameter; 5) Two ⅜" long wood screws; 6) One thumbtack; 7) A dab of glue.

Here's how to assemble it: 1) Tie the 14" strips to the corners of the cloth; 2)



Tie the loose ends of the 14" strips together. This makes a sort of a parachute; 3) Attach the knotted ends to the balsa disk with a dab of glue and the thumbtack — center the knot as closely as possible, but don't worry, it's not critical; 4) Screw the 010 engine to the other side of the balsa disk.



Here's how to fly it: 1) Twist up the 14" strips clockwise, until the corners of the 18" cloth come together; 2) Fire up the 010, adjusting the needle valve so it peaks out with the engine pointing straight up — use the 3" prop furnished with the engine; 3) Hold the running engine in one hand, the cloth in the other, making sure that the strips and cloth are twisted; 4) Launch straight up.

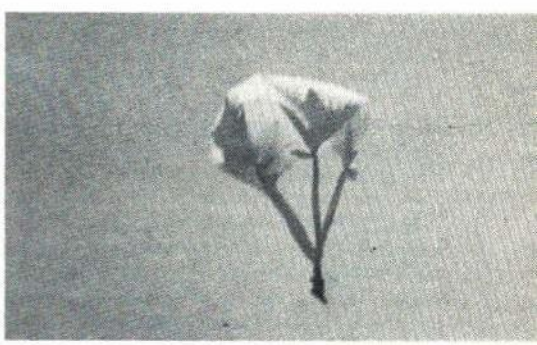
On the way up, the engine torque, due to the anti-clockwise rotation of the propeller, will tend to keep the cloth strips twisted clockwise, and prevent the cloth from opening up. When the engine quits, it falls below the cloth, the strips unwind, and the cloth blossoms into a parachute.

Sounds crazy? It is — but I've had more fun with it than a lot of guys have with expensive R/C jobs. You will too.

When tired of it all — wipe your hands on it. It's the universal flying machine; bandannas are found round the world.

Prepare for flight by twisting bandanna and cloth strips clockwise. Canopy stays shut as engine's torque keeps the twist in.

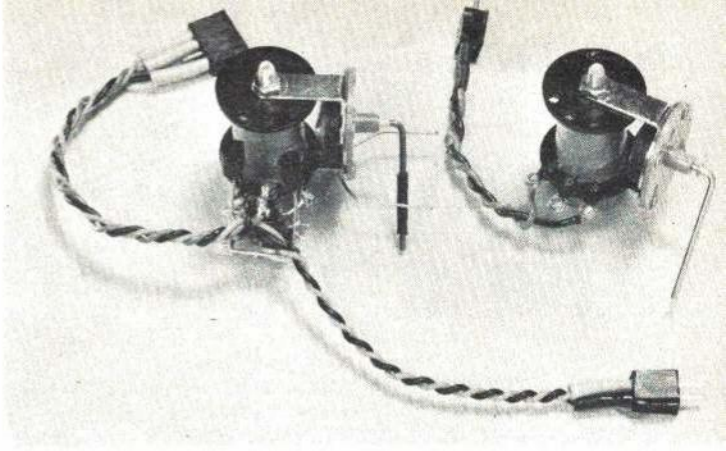
The only way to launch — straight up! Ken shows how. Bandanna fans call this the up-chuck. Spectacular!



There it is! Our Flying Bandanna, in expanded glory, finishes its flight with a soft landing on planet Earth.

MICRO-MINIATURE R/C

The Albin Receiver



Baby Adams actuators may be used. Unit on left has a two-transistor switcher for dual drive added at its terminals. To use the regular type at right, spring-load the arm in one direction and connect to the entire coil (disregard center-tap).

From a designer of hearing-aids comes this ultra-tiny tone receiver.

BILL ALBIN with HOWARD McENTEE

Some advanced RCers might question the wisdom of publishing a super-regenerative receiver, especially for the crowded 27 MHz frequencies. This may possibly be the very last such regen we shall publish with the possible exception of some other special purpose job. This receiver's small size and light weight (1 1/16 x 13/16 x 1/2", about .22 oz.) fits it for purposes beyond the capabilities of other receivers, even other regens. Therefore, we make no apologies for this presentation — but do look forward to the time a superhet of similar capabilities can be packaged in this size and weight — and at this low cost!

SOME two years ago, midwestern modeler Bill Albin saw notes we had in AMERICAN AIRCRAFT MODELER on an extremely small German receiver that looked ideal for the tiny R/C planes Bill was anxious to try. Only problem was that the receiver required an audio tone around 3500 cycles; Bill had just completed a brand new transmitter that would produce only about 700 cycles. The receiver maker told him its tone response couldn't be dropped to match Bill's new transmitter, due to tone filter size limitations. Bill had only one choice — make a micro-miniature set of his own. As a circuit designer for a hearing aid manufacturer, he had all the tiny parts available and the capability of using them.

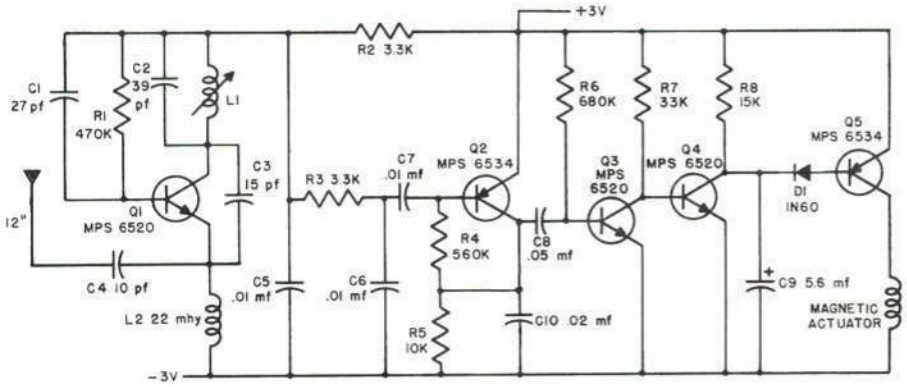
Many super-regen circuits were tried before he found one that would afford good sensitivity and stability, would not swamp close to the transmitter, and would eliminate the transformers used in very small commercial R/C receivers (such as the Otarion O-21 and a later Jap copy of same). His final model measured about 7/8 x 5/8 x 7/16" (it could have been made half this size with the parts Bill had, but would have been much harder to build) and weighed .1 oz. It worked fine, was flown in several small planes with 02 Cox engine power. Some 13 of these receivers were constructed by Bill and a friend; several other local modelers started copies but their PC boards ended up pretty much solid blobs of solder! There was also another problem; the parts were available only to electronics manufacturers in large quantities — and total parts cost was $35-40! Which would never do.

Quite a few people seemed interested. Some couldn't manage the delicate soldering. Others couldn't manage the cost (even if the parts had been easily available). Bill undertook a redesign. His aim was to use only parts listed in catalogs of the large mail-order electronics houses, and at a fairly reasonable total cost. Since parts would be a little larger, so would the PC board, and most tinkerers should be able to handle the construction. The result is what you see here — a set weighing about .2 oz., measuring 1 1/16 x 13/16 x 1/2" overall. Best part is cost; it comes out a bit over $10. Unfortunately, no very small coil form could be found in the mail order catalogs. And, of course, there was no source of PC boards.

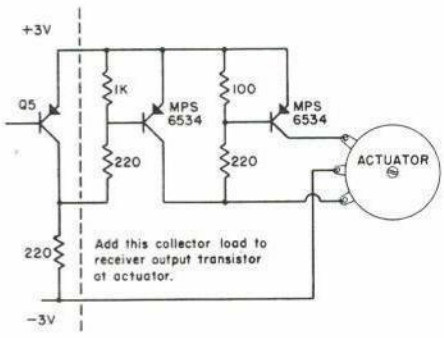
We have arranged with Ace Radio Control to supply these special components. In fact, Ace has a complete kit of parts at a price little over what you would have to pay the electronics houses; you'll save time too, since the parts that Bill specifies have to come from several different sources. For those who prefer to buy their own parts, we give a complete list, and we also show here the PC board layout for "home etchers."

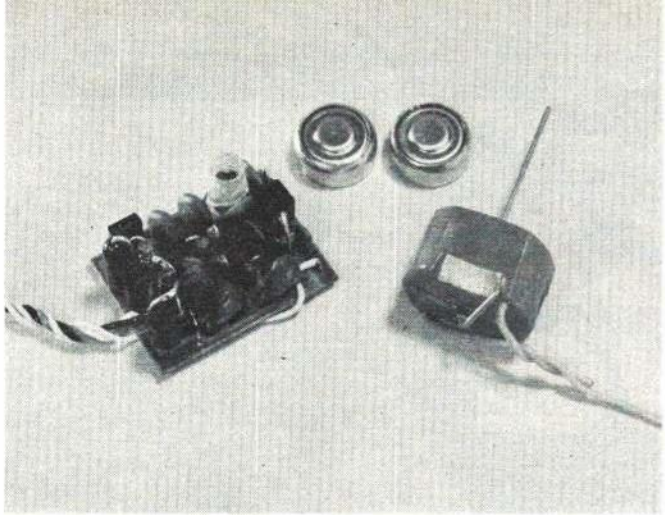
Lower cost components mean wider tolerance in some parts, notably in the capacitors from .01 to .05 mf. This *might* mean that one capacitor (C10) will have to differ from our circuit. More on this will be found later.

The schematic shows the receiver is single-ended for escapements and one-coil magnetic actuators still a highly popular method of flying. There are no transformers.

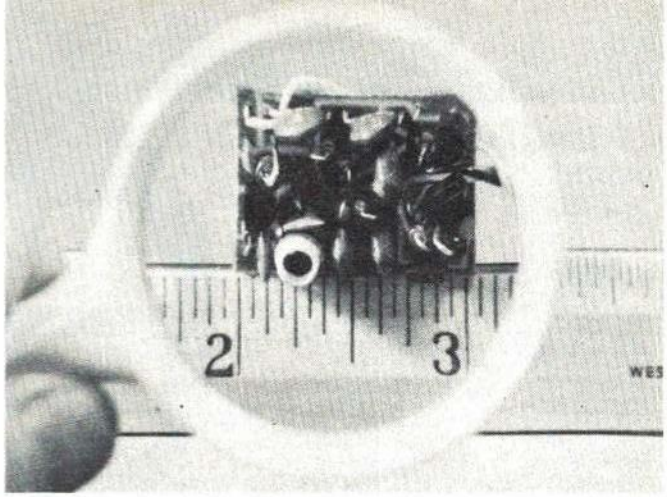


The Adams circuit for dual-coil actuator drive from single-output receivers can be assembled without PC board. Add parts to actuator's terminals.





The smallest and lightest system for pulse rudder-only. Bentert actuator and Eveready S76 silver oxide dry batteries.



The micro-miniature .2 oz. receiver is like a scale model of older, super-regen units. Sensitive, good enough range for larger planes, and easy to construct. Could be smaller — but more difficult.

For those who work from a kit here are tips on how to assemble a receiver. The PC board comes drilled (the two hole sizes are #68 and #72, with the larger holes for capacitors C5-C10 and for RFC). A 3/16" hole is required for the coil L1, which comes already wound in the kit. The PC board copper side has a bright finish that does not require cleaning with steel wool. You'll note that some of the holes in the board are at the edge of the lands, rather than in the center. To make reliable connections at these points it's best to bend the lead across the land, before you clip and solder it. And that brings to mind another point — make sure all component leads are clean and bright before you install any parts. Excess heat can ruin many of the parts and there just isn't enough room to apply a heat-sink on most of the leads. You don't need to shine up the transistor leads; they are gold-plated and accept solder beautifully.

First part to install is the coil L1. This is 7/16" long, and has 10 turns (in the kit version) of #30 wire. To put the kit coil into use, you must carefully peel off either wire end until you have exactly 9½ turns, then bend the wire downward to go through the board holes. We found Hobbypoxy (either #1 or #2) ideal to fasten the coil form to the plate. The wire on the Ace coil has a coating that is removed by solder — but you can scrape the ends if you want to hurry the process.

With L1 attached, you can start in that corner of the board to install parts. Insert a few at a time, check your work carefully (it's *much* easier to solder parts in place than to remove them, so heed that "check your work carefully" bit!), solder and clip off surplus wire. We prefer to leave the transistors until last—less chance of ruining them with excess heat. Needless to say, you can't tackle this assembly with a 50 or 100 watt iron! We suggest nothing higher than a 25 watter — and 15 W would be preferable (and safer). Special low melting-point small diameter solder is mandatory — the Ace kit includes the correct kind.

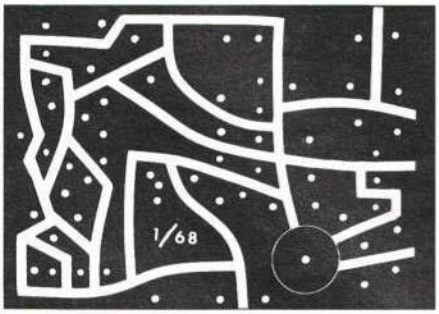
As we have noted, the C10 might need change. This is the disc capacitor on the edge of the board nearest the antenna lead. So don't shove this one all the way in its holes and clip the leads short until operating tests have been made — just tack-solder C10 in place temporarily. Be *sure* the flat sides of the transistors face as indicated on the parts placement drawing, that the black ring on the diode is nearest the board surface, and that the round end of C9 (which is the positive end) is *away* from the board surface. It doesn't make much difference how you install the other parts, but checking is easier if you position the capacitors so you can most easily read their capacity markings. The leads of the disc capacitors should be spaced exactly to fit t' holes; however, we found some of the tiny square capacitors had wider lead spacing, and their leads should be carefully bent inward as required.

Solder on the four flexible leads last. The antenna lead should be 12-18" long; the red lead is for the positive battery connection, and black is for negative. Check the solder side of the board most carefully, preferably with a magnifying glass, to make sure that you haven't "bridged" solder across adjacent lands. Needless to say, you should use the very minimum of solder for all connections that will do the job. Too much makes checking harder, is likely to bridge across lands — and it just plain adds weight! It is smart to carefully scrape all rosin off the bottom of the board, then clean it up with alcohol; the latter may be delicately applied with a pipe cleaner or very small brush (don't dunk the whole works in alky!).

This receiver was intended to operate a tiny proportional actuator in single-ended

Continued on page 64

Twice-size PC board layout, copper side shown. Black lands are copper; tuning coil is mounted in cut-out hole at the circle.



PARTS LIST

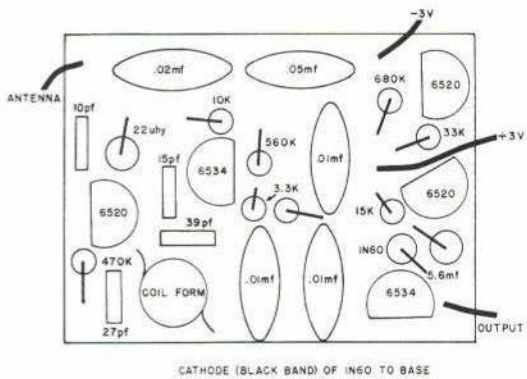
Q1, Q3, Q4	Motorola type MPS6520 NPN
Q2, Q5	Motorola type MPS6534 PNP
D1	1N60 diode
C1	27 mmf Gulton NPO Min-C-27-K
C2	39 mmf Gulton N330 Min-S-39-K
C3	15 mmf Gulton NPO Min-C-15-K
C4	10 mmf Gulton N750 Min-U-10-K
C5, C6, C7	Erie .01 mf. 25V type 5835-000-Y5UO-103Z
C8	Erie 05 mf. 12V type 5635-000-Y5FO-503M (two included in Ace kit)
C9	Kemet 5.6 mf electrolytic type K5R6C6K
C10	Erie .02 mf 25V type 5835-000-Y5U0-203Z
R1	470K ohms 1/8W carbon 10%
R2, R3	3.3K ohms 1/8W carbon 10%
R4	560K ohms 1/8W carbon 10%
R5	10K ohms 1/8W carbon 10%
R6	680K ohms 1/8W carbon 10%
R7	33K ohms 1/8W carbon 10%
R8	15K ohms 1/8W carbon 10%
RFC	Miller RF choke 22 microhenry type 70F225A1
L1	3/16" dia. coil form and core (Ace Radio Control)

#30Enam. wire for L1

Printed circuit plate, 3/64" fiberglass epoxy (Ace Radio Control)

Fine flexible insulated wire for leads and antenna.

Top view of components shows location of parts and their orientation. Note placement of the flat side of the transistors.



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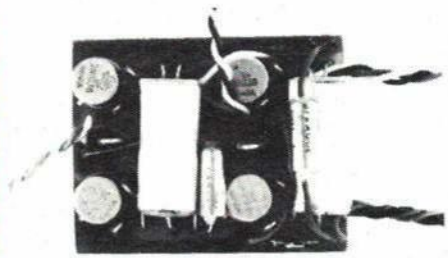

SIMPRO III KIT

The Simpro III kit above is a refinement of the earlier Simpro units which have appeared in American Modeler. The October 1967 issue contains full info on a relayless version for use with commercial actuators . . . Does away completely with any adjustments—and provides non-interacting rudder and elevator controls when used with the Ace Jansson or Sim-Plus transmitters, or most other GG transmitters. Motor control is achieved by full on and full off . . . The Simpro III makes into a compact unit. Measures 1½ x 1⅞ x ¾". Designed to work with most of the commercial proportional actuators available. Go-Around types are required for motor control. Compatible with Rand HR1 and HR2. Mini Max, Mini Max RM, Ghost, Airtrol, Bellamatics, and home made units built around Micro Mo motors. (NOTE: 1.8 ohm resistors required only for Micro Mo units are not furnished in kit.) . . . Kit contains reed units, all transistors and diodes, capacitors, resistors and an etched and drilled PC board to duplicate this fine decoder. Connectors not supplied.

No. 15K43—Simpro III Kit $27.75

Note—Simpro III systems require pulse rate of 15 to 25 pulses per second. Transmitter modification may be required.

SIMPRO III DECODER PACKAGE OFFERS

You've got a good GG system, and it's a lot of fun—but you have wished for something that performed as well, in a plane just a bit larger? Well, there's no reason to start from scratch—simply add the Simpro III decoder unit, along with the required actuators and mounting board, and you are there! The Simpro III decoder can be adapted to almost ANY existing simple GG system and provide you power enough for engines up to .45! . . . Extra cost is minimized since you can use your transmitter and receiver (relay or relayless), and with Simpro III, Rand HR1 and HR2, you have proportional Rudder, Elevator and positionable Motor Control. Packages include a special 3/64" mounting plate for the Rand units to simplify mounting—template for use with any servo is silk screened on. . . . Or, you have a GG system using the LR3. Use the LR3 as the rudder-motor servo, and add a Rand HR1 for elevator and you cut cost still more with our package #2. . . . The Simpro III decoder pulses fast enough so there is only a slight dither in rudder; elevator works only on command.

No. 15K1—Simpro III package #1: Contains Simpro III decoder kit as detailed above, Rand HR1 and HR2, and special 3/64" mounting plate for use with YOUR GG receiver and transmitter combination. A $65.00 value. . . . . Only $59.50

No. 15K2—Simpro II package #2: Contains Simpro III decoder kit as above, Rand HR1, special 3/64" mounting plate for use with your GG combo and your LR3. A $46.00 value. Only $41.50

Note—Simpro III systems require pulse rate of 15 to 25 pulses per second. Transmitter modification may be required.

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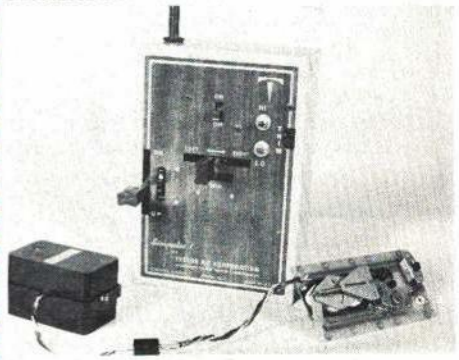
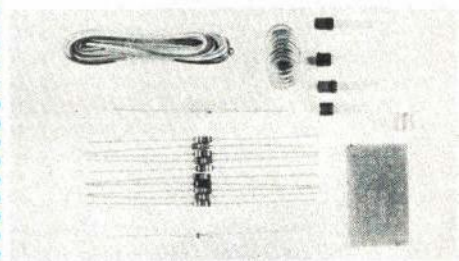


COMING SOON in pages of "American Aircraft Modeler" are Don Dickerson's conversion of the Testor Skyhawk for GG operation. Ace will have complete conversion kits for this. They will be available as soon as publication of this material is made in this magazine.



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Versapulse Kit does not contain: Pots, switches or stick assembly. Pots required for the stick are 2.5K for width, 10K for rate, and 5K is required for rate adjustment.

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No. 15K50—Marks Basic Versapulser Kit, PNP $10.75.

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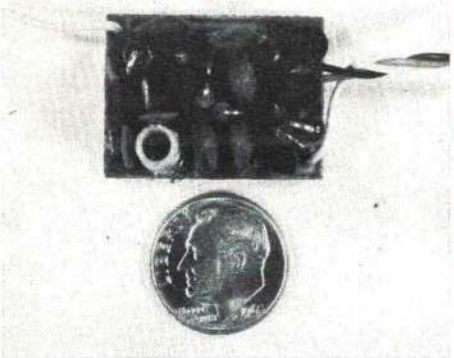
No. 15G46—Rand Dual Pak, 6PAK 6080, $75.00.
No. 15G40—Rand GG Pak, PAK, 6040, $39.90.
For complete listing see our new 1968 Handbook-Catalog.



NEW! ALBIN MICRO RECEIVER KIT

Would you believe a superregen receiver weighing just .2 oz? This Bill Albin kit design measures 13/16 x 1 1/16", uses silicon transistors, 1/8 watt resistors, micro mini caps, drilled 1/32" PC base. Single ended output for actuators of Bentert type.

While it is superregen, this kit will be used in applications where this is not too important. Makes indoor R/C a distinct possibility!

Recommended for those with some building experience, since small size makes care necessary. Not complicated, however.

No. 12K60—Albin Micro Receiver Kit, $12.95

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NEW! ACE GG PACKAGE!

Galloping Ghost Transmitter by Dick Janson 9 volt battery- Citizenship SSH Receiver and the new Rand GG pack, with batteries

If You are going GG–Go First Class–With ACE GG!

Now you can go First Class all the way with simple proportional on Galloping Ghost. Ace has pioneered in proportional for 14 years. This is a combination package that we believe takes the best of all of the components that are available and puts them into one first class package.

Start with the Galloping Ghost Transmitter by Dick Janson, which has been acknowledged as being one of the most versatile, couple this with a the new improved Citizenship SSH Receiver and the new Rand GG pack, with LR3 and new 600 ma GE sintered and vented batteries, and you have a winner! The package even includes a 9 volt battery for the transmitter—the dependable Mallory M1603. The Ace GG package is completely prewired and requires only installation in the plane. . . . Weight of the receiver with GG Pak, LR3, nickel cadmiums, and harness, hooked up ready to install is approximately 7 ounces, yet it has power enough to handle planes with engines up to .35. **Go First Class—Go Ace GG.**

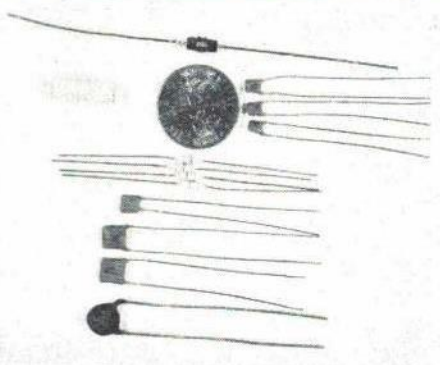
No. 10G1—Ace GG Package, ready to go with all batteries $129.50

VARI-CHARGER

The new Ace Vari-Charger is a most useful accessory—it will charge nickel cadmium batteries from 20 mils to 150 mils. It is capable of charging up to 12 volt packs . . . The dial is indexed, and an easy to read chart is furnished which enables you to set your milliamp reading for the battery pack size you are using . . . Completely isolated from the AC line supply . . . The unit is housed in a handsome Dakaware case which measures 3 25/32" long and 2 21/32" wide and is 1 15/32" deep. Metal cover is used and has an on-off switch. This is an extra deluxe item, using highest quality newly manufactured transformer, UL approved line cord, 500 milliamp diode, on-off switch, and full instructions.

Available in two forms, either as a kit and completely assembled

No. 34K21—Ace Vari-Charger Assembled, $8.95
No. 34K22—Ace Vari-Charger Kit, $7.50



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No. 18K37—.02 UF/Erie 25V Trans-Cap, .25
No. 18K38—.05 UF/Erie 12V Trans-Cap, .25

Submini RF Choke. No. 17K51—22 UHY, $ .75

Submini Coil Form (Glass Tork). 3/16" diameter, epoxy, slug for up to 70 MC. Not wound. Must be cemented into base.
No. 17K52—Glass Tork Coil Form/Slug, $ .45

Submini Switch. Used in Testor Skyhawk. Is 1 x 13/32 inches.
No. 30K33—Continental-Wirt, DPDT Slide, $ .50

1/8 Watt Resistors, 10%.
No. 29K33 (Specify value), $ .25 each.
1K, 1.2K, 3.3K, 10K, 15K, 33K, 47K, 470K, 560K, 680K.

MORE THAN JUST A CATALOG FOR 1968!

Our 1968 version of the Ace R/C Catalog is also a handbook—has an R/C Glossary; How To Solder; Pulse Proportional Control for Rudder and GG, including Decoders; Schematic Symbols; Batteries and Charging, Resistor Color Code, Transistor Chart; Electric Motor Spec Chart and many more Data Sheets you will refer to again and again. Three holes punched, 8½ x 11 in size, it is designed to be added to! Will fit special* Ace Binder, for permanently keeping any of your R/C instruction as well . . . In addition it lists all the latest Ace R/C Products and thousands of other R/C items and R/C accessories made by other manufacturers all over the world . . . Cost is only $1.00. BUT this is refundable on your first order! So actually the catalog costs you nothing. Your order also places your name on the Ace mailing list to receive regular additional R/C Data info, and newsletters . . . The Ace Handbook-Catalog is a must for the tinkerer, the Sunday and the sport flyer. We have served the R/C field since 1953 . . . Send your catalog buck on a round trip today. You can't lose!

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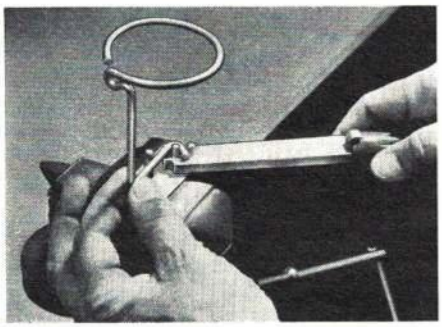
Guaranteed delivery anywhere. Orders over $3.00 sent prepaid. Orders under $3.00 please add 50¢ for postage and packing.

NEW PRODUCTS CHECK LIST

Write the manufacturers for more data; tell them, "I saw it in American Aircraft Modeler."



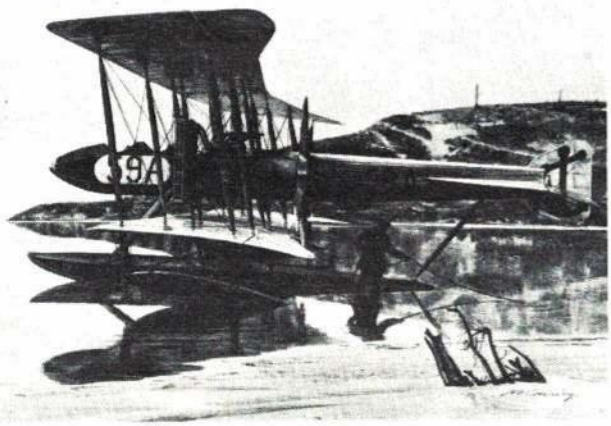
Vinkemulder Mfg./Wireformer. Bending music wire into useful shapes, landing gear, etc. for model aircraft can be difficult. The Wireformer is a great help, especially when working with the 1/16" to 1/8" dia. sizes. Just clamp the Wireformer in a vise and follow the directions; the pivoting arm makes it easy. Best of all, it forms neat, small radius (3/32") bends — even with 1/8" wire. Forget about sharply bent corners and the broken joints that result. One session, bending a wing mount for a bipe, will convince you. The Wireformer is $3.98 postpaid; get a spec. sheet from: VINKEMULDER MFG. CO., 917 Princeton Blvd., Grand Rapids, Mich. 49506.

Sterling Models/Fokker D-7. Sterling introduced their latest beauty, the Fokker D-7, at the HIAA show. Produced in the tradition of their Stearman PT-17, the D-7 is super-detailed. For multi RC or Controline, this kit is complete! All parts are die-cut or shaped. Ply and hardwood used for strength when necessary. Landing gear is 3/16" wire! Wing struts-1/8". There's a hardware pack and a steel cowl. Wing mount bolts are Nylon; special Nylon pushrods and horns are included for the controls. Among the scale details: model outline and shape, wing and stab rib spacing and fuselage construction and stringers. Fokker-style wood leading edge of wing is reproduced. Spandau machine guns and the Mercedes engine are detailed in plastic. Two large (35 x 45) plan sheets aid assembly. Wing span is 58 1/2", area about 950. Scale-2" to the ft.; .45 to .65 engines are recommended. Sterling was bombarded with requests for another kit like the Stearman. This looks like it. Kit price is $39.95. Introduced at the same time was their Beginners Ringmaster Bipe. Only 14 die-cut parts are needed to assemble the 21" span, profile controliner for .049 engines. Add the formed parts and you have a plane to "solo" with in minutes. Kit price $2.50. For more data on both of the above: STERLING MODELS, Belfield & Wister Sts., Philadelphia, Penna. 19144.

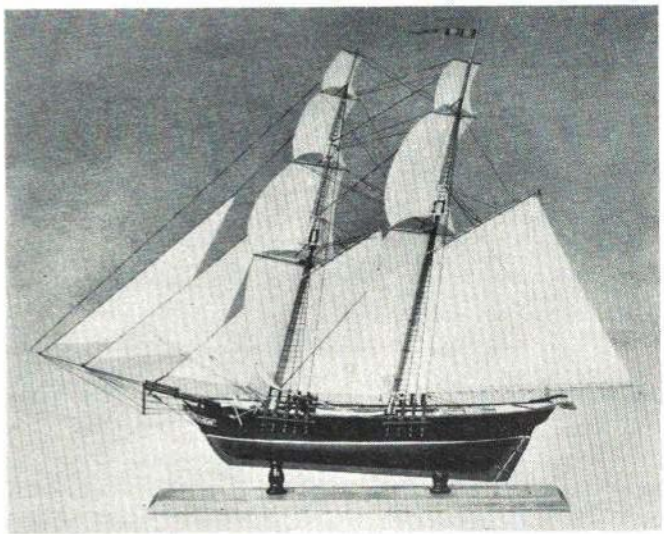
deBolt Model Eng./Cobra RC. Long awaited "Live Wire" Cobra is here. First of a series, the Cobra is a "looks like" RC model. Designed as a full-pattern stunt ship, it has the realism and good looks of the real aircraft; a desirable combination. Aimed at the medium-size engine (.29 to .50), the Cobra is lightweight at 5 1/4 lbs. set to go. Span is 58", area is 630 sq. in. DMECO has engineered a modern, deluxe kit — parts are cut, shaped and pre-fabbed to allow quick assembly. All necessary hardware is included. Kit price is $34.95.

Increased material costs make it necessary for DMECO to raise some kit prices. The following: Champion, Super Cub and the Jenny are now $21.95; the P-Shooter is now $27.95.

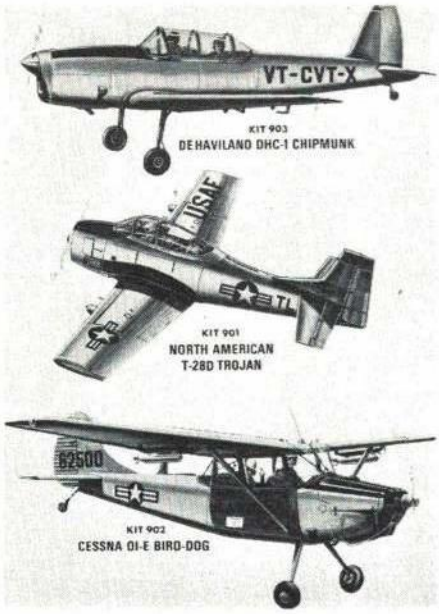
Positive Flow fuel tanks are available again. Improved tooling and a shift from brass to tinplate has eliminated production problems. All have inside baffling and external mounting flanges. Sizes range from 2 to 8 oz. and prices go from $1.69 to $1.99. Write: DEBOLT MODEL ENG. CO., 3833 Harlem Rd., Buffalo, N. Y. 14215.



Historical Aircraft Prints/Litho Prints. Heritage of the Air artist Merv Corning started a new historical series of aviation paintings and stories under the title, Historical Aircraft Prints. Heritage writer, Jim Weiser aids in this portrayal of the lesser-known aviation subjects. Ready now is the first series, WWI types: the Navy Gallaudet hydroaeroplane with a four-bladed, mid-fuselage drive (see photo); the LUSAC-11 pursuit and the venerable Jenny. Each subject is finely lithographed in full color on 17 x 25 stock. A complete story of the aircraft or incident depicted is included too. Prints are $5 each. Hang them in the home or office. A second series is underway — each series of three will be released quarterly. More info: HISTORICAL AIRCRAFT PRINTS, 4032 Wilshire Blvd., Los Angeles, Calif. 90005.



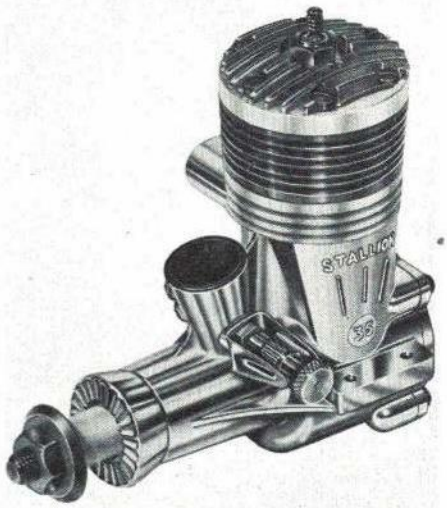
Scientific Models, Inc./Baltimore Clipper Ship. Scientific has a new addition to their model fleet of historic vessels. It's an exact scale replica of the Baltimore Clipper, Dos Amigos. These clipper ships were famous forerunners to the China Clippers. The hull is of carved wood (less work for you to do). Over one hundred metal parts are included with a complete set of cloth sails. Instructions are thorough too, so you'll have no difficulty building and displaying the 22 1/4" model. Ask for the kit, no. 172, at $16.95. Query: SCIENTIFIC MODELS, INC., 111 Monroe St., Newark, N. J. 07105.



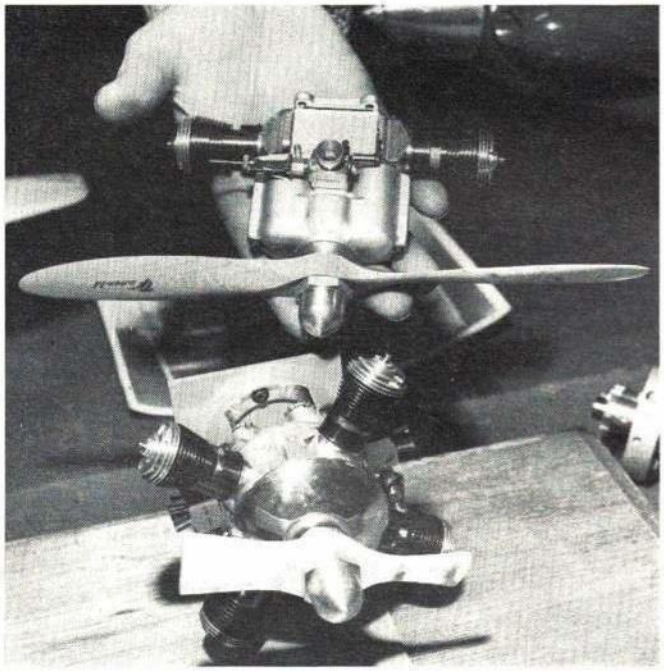
Paul K. Guillow, Inc./New Scale Kits. With this series Guillow is offering the novice, balsa model builder a step-by-step approach to the construction of flying models. The three kits, T-28D, DHC-1 and O-1E, were chosen because their scale outlines allow good flying performance and the realistic look. They are timely too! Wood sheet stock is light enough for good flights. Power is furnished by a loop of rubber strip and a 5" plastic prop. Each kit has a formed plastic cowl, wheels and canopy or window covering. Tissue and insignia are included as is the wire hardware. The cost per kit is a low $1. Ask: PAUL K. GUILLOW, INC., P. O. Box 229, 40 New Salem St., Wakefield, Mass. 01880.

Pactra/Scale Model Flats. Among the scale model enthusiasts, this means paint colors with a flat finish. Pactra is now packaging their Scale Model Flats in a new carton of 24 colors at 35c each. The authentic, matched-to-life colors are popular in the brushing weight. Now eight of the new colors are also available in 79c spray cans. Ask: PACTRA, INC., 6725 Sunset Blvd., Los Angeles, Calif. 90028.

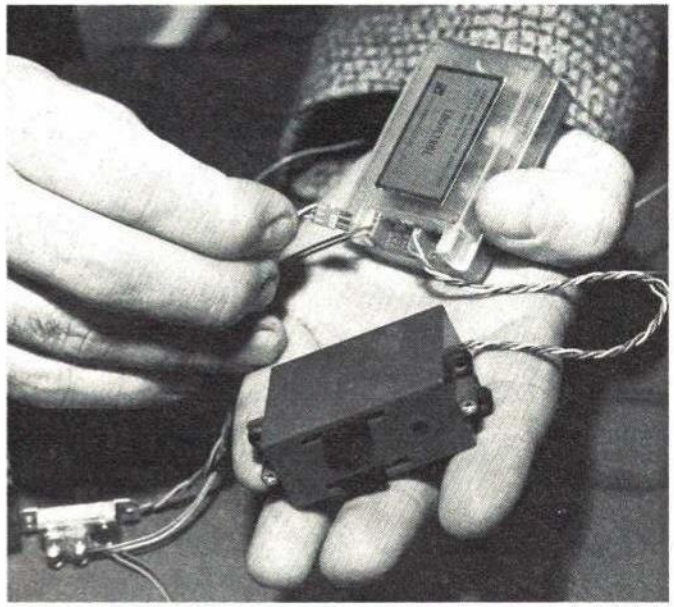
Historical Aviation Album/Volume Five. Produced by Paul R. Matt, the volumes of the Historical Aviation Album bring to the modeler and aviation enthusiasts, in general, well-researched articles, accurate scale drawings and choice photos about fascinating aircraft. Each volume is 8½" x 11" and printed on heavy stock. Volume Five, available now for the first time, is loaded with 116 photos and 13 full-page, scale drawings of these aircraft: 1913 Martin TT; Wright F2W-1/-2 racers; Curtiss P-6E Hawk; Grumman G-44 Widgeon; Brewster Buffalo; Rover Aero Engine and the Christmas Bullet. Also there's the biography of Capt. Thomas S. Baldwin, a balloonist, dirigible designer and inventor of the modern parachute. Keep your reference collection complete; order Volume Five at $3.50 postpaid. Volumes One through Four are available at $2.98 each ppd. Request the illustrated brochure: HISTORICAL AVIATION ALBUM, P. O. Box 33, Temple City, Calif. 91780.



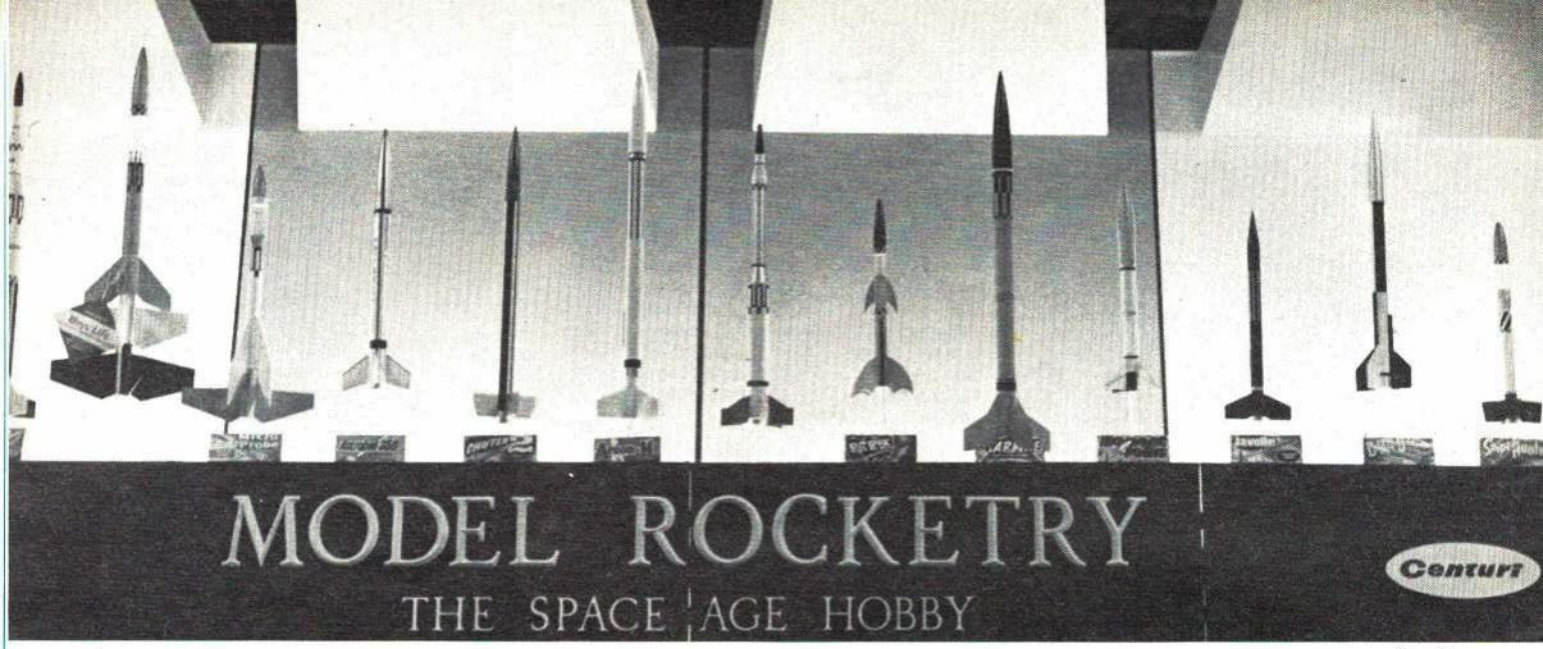
K & B Manufacturing/Stallion .35. As an answer to queries from many modelers, K & B has put back into production the Stallion .35 engine. A stand-out value at the low price of $9.95, this engine has many of the features found in the higher-priced models. Use it for fun or competition. K & B MANUFACTURING, 12152 S. Woodruff Ave., Downey, Calif. 90241.



Ametek-Calmec/Multi-Cylinder Glow Engines. Calmec calls these the "two, new, hot ones . . . for RC modeling." Serious RCers, searching for that smoother, lower-vibration power supply, will want to examine Calmec's offerings. First is the XA 902, a two cylinder engine that displaces .30 cu. in. Its weight is 14 oz. and .6 BHP is developed. Length overall is 4⅛". With a 11-6 prop, the peak rpm is 10,500; at idle it's 2,000. Its main shaft is supported by twin ball bearings. The XA 904, mounted on the stand, is a four cylinder, .61 cu. in. engine that is even smoother in developing its 1.01 BHP. Weight is 27 oz.; length is 5¼" and a diameter of 6". Peak rpm is 10,500 with a 12-6 prop while the idle is down to 2,000. An accessory unit, weighing only 3 oz., snaps on the XA 904, adding dummy cylinders so that it looks like a radial eight! Write for prices: AMETEK/CALMEC, 5825 District Blvd., Los Angeles, Calif. 90022.



E K Products, Inc./Logictrol III. Months of development went into the Logictrol III. Objectives sought over the Logictrol II system were improved reliability, lower cost and less weight. The result — Logictrol III and its Mini-System — will be on your dealer's shelves as you read this. Flying weight is now 15 oz. The airborne power pack was reduced in size as were the servos (by 40%) and the receiver (by 50%). Shown is the Mini-Mite III servo. Output is dual linear with the stroke-⅜" and the thrust-4 lbs. Servo case design allows easier and cheaper replacement of damaged parts; in most cases the user will be able to do the repair. Great reliability comes from the three wire link between the servo and the receiver, an untapped 4.8 V battery and the servo plugs integral with the Rx case. High impact plastic was used, wherever possible, to reduce crash damage. Receiver retains same RF, IF and decoder circuits as used before. Coils and the IFs are smaller. Amplifier circuit was simplified. Get the complete technical story from: E K PRODUCTS, INC., 3233 W. Euless Blvd., Hurst, Texas 76053.



Tom Roe.

COUNTDOWN
Low-Drag Design

Defined are two major design areas that affect aerodynamic drag as: shape and finish. Author asks the questions and supplies the answers too!

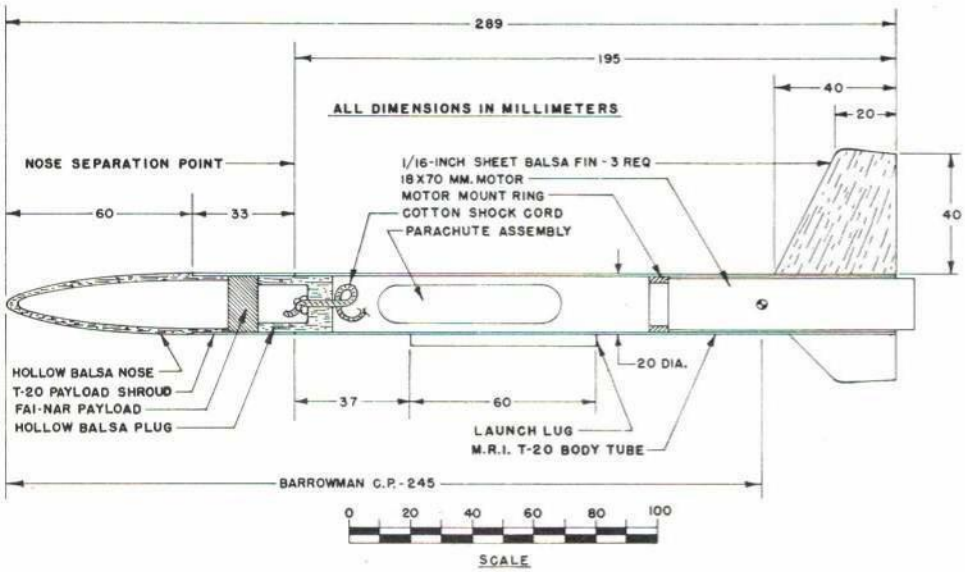
G. HARRY STINE

THREE major forces act upon a model rocket in flight: motor thrust, gravity and aerodynamic drag. You can select motor thrust force to some extent by choosing the proper model rocket motor; motor thrust acts on a model for only a short period of time during the flight. You can't do anything about gravity . . . yet. It's there, always acting to retard the vertical flight.

But there is something that you, a model rocket builder, can do to reduce the forces of aerodynamic drag. Drag forces can be quite high, as you can attest if you've had a well-glued fin come off in flight!

To give some idea of the magnitude of these drag forces, I've calculated the theoretical performance of a hypothetical model rocket, the Paradygm-I, with zero drag and with two different drag coefficients. Performance values are shown in the table. The flight-with-drag calculations were made from the Malewicki Report (Estes TR-10). Paradygm-I is a reasonably typical model rocket, and the two drag coefficients, 0.6 and 0.8, are typical of those which actually exist in the models that we fly. For a basic discussion of drag coefficient, refer to "Handbook of Model Rocketry." The two coefficients, 0.6 and 0.8, can be the difference between a well-made, well-designed model rocket and a model that is just slapped together with no attention to drag reduction.

The figures speak for themselves. The differences between burnout velocities is significant, whereas the wide variation in total altitude is striking. The best streamlining permits a maximum altitude that is



MORLIN-I
PAYLOADER

Centuri Engineering displayed a variety of designs at the recent California MATS. Left to right: Defender, T-Bird, Micro-Probe, Astrobee-350 semi-scale, Chuter-2, Arcon, Recruiter, Bat-Rock, Jaguar, Honest John, Javelin, IRIS and Snipe Hunter.

only some 30% of the zero-drag potential altitude, while the higher-drag example is about 26% of the zero-drag.

Don't knock the 4% difference between the two drag examples; it often wins contests! There is 125 ft. of difference in peak altitude, about 12%!

It should be obvious from this hypothetical example that you can achieve significantly better performance if a model has lower aerodynamic drag.

I ran out an extension of the Paradygm-I example to investigate effects of small changes of weight due to more paint or getting a better finish. Strangely enough, a model of the Paradygm-I is *less sensitive* to weight changes than it is to an improved drag coefficient! Another 0.1 to 0.2 oz. of model weight affects the final altitude a lot less than a change in drag due to better streamlining and finish! Check this for yourself. The small amount of extra weight added by a better finish or improved aerodynamic shape pays off handsomely in performance.

Later, when I can get proper charts and graphs drawn up, we'll discuss the "why" of improved aerodynamic drag. Our discussion now will be confined to the "how" of reducing aerodynamic drag. Some of the "why" can be found in the "Handbook" for those of you who are impatient.

There are two major areas of design and construction that affect aerodynamic drag: 1) shape, 2) surface finish. To illustrate, I've designed the Morlin-I. Drawings and dimensions appear here. This is a competition payload model. It could have been a simple altitude competition model, too (it still can be if you eliminate the payload section, hollow balsa plug, etc. and make the body tube the same length as the sum of the payload shroud and original body tube length). Morlin-I would make a good model for the new NAR Quadrathon Competition that requires an entry be flown in Class 1 Altitude, PeeWee Payload, Streamer Spot Landing, and Class 1 Parachute Duration with no changes except in the recovery device. Yes, Morlin-I is based upon Talley Guill's Dubnica Payloader but is a considerable improvement over the Talley Bird — it's two design generations removed, as a matter of fact.

Nose Shape: There are two forms of aerodynamic drag affecting the nose of a subsonic model rocket in flight: pressure drag and friction drag.

Nose shapes having the lowest pressure drag are, in order of increasing pressure drag coefficient: ellipsoidal, ogival, and hemispherical — with very little difference between the last two.

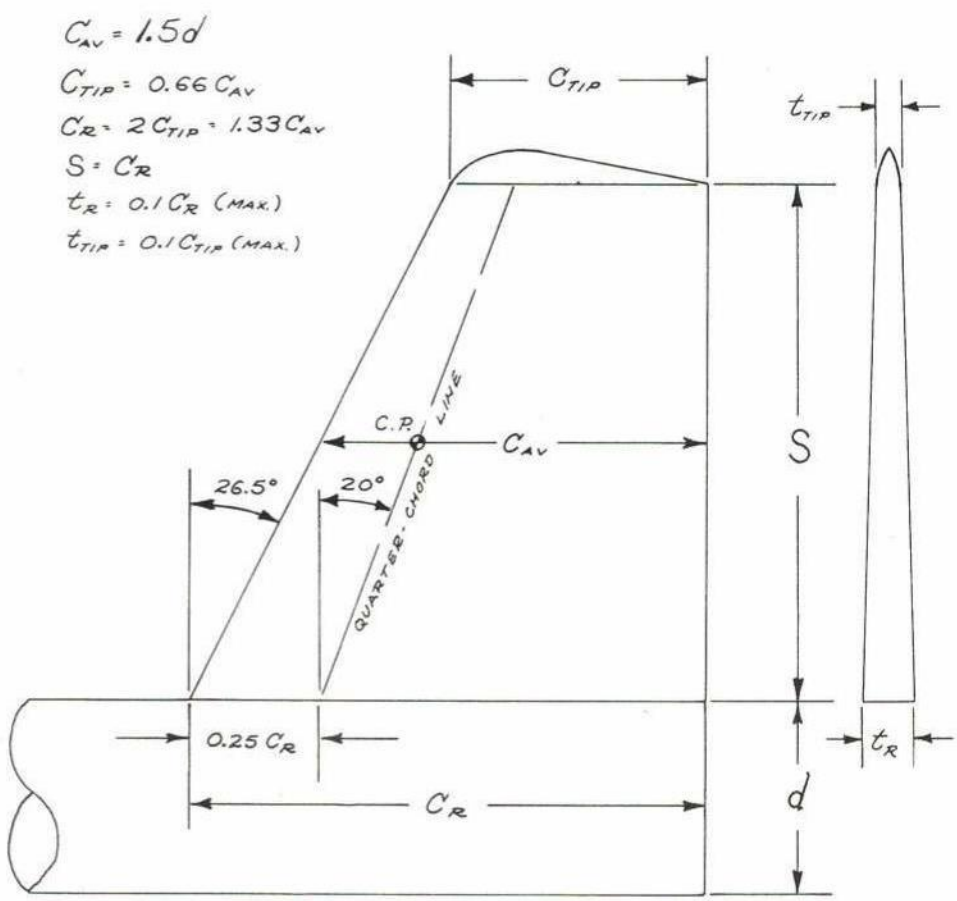
Friction drag on the nose depends upon the total surface area (called "wetted area" in aerodynamic parlance) and the surface smoothness.

The best compromise between pressure drag and friction drag coefficients of an ellipsoidal or ogival nose shape is a

Continued on page 69

Model: Paradygm-I		**Engine:** B.8-6	
Body tube: BT-20 (or equiv.)		**Gross weight:** 1.50 oz.	
Drag coefficient	0 (drag free)	0.6	0.8
Burnout altitude	324 ft	250 ft	245 ft
Burnout velocity	463 ft/sec	340 ft/sec	320 ft/sec
Coast altitude	3330 ft	820 ft	700 ft
Total altitude	3654 ft	1070 ft	945 ft

Cosmonaut Pavel Romanovich Popovich received a briefing from two Yugoslav Young Pioneers at the 18th Int. Astronautical Fed. Congress held September 1967 in Belgrade.



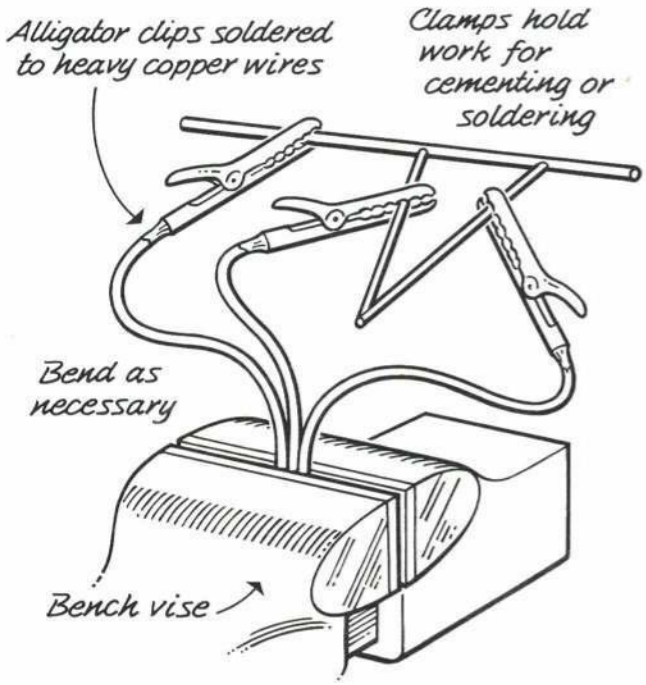
LOW-DRAG HIGH-EFFICIENCY SUBSONIC FIN DESIGN

FIGURE 1

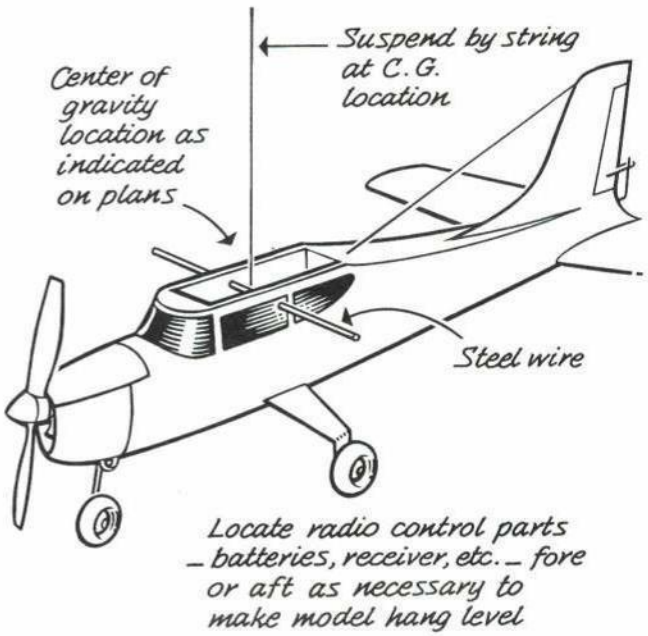
H. A. THOMAS

SKETCHBOOK

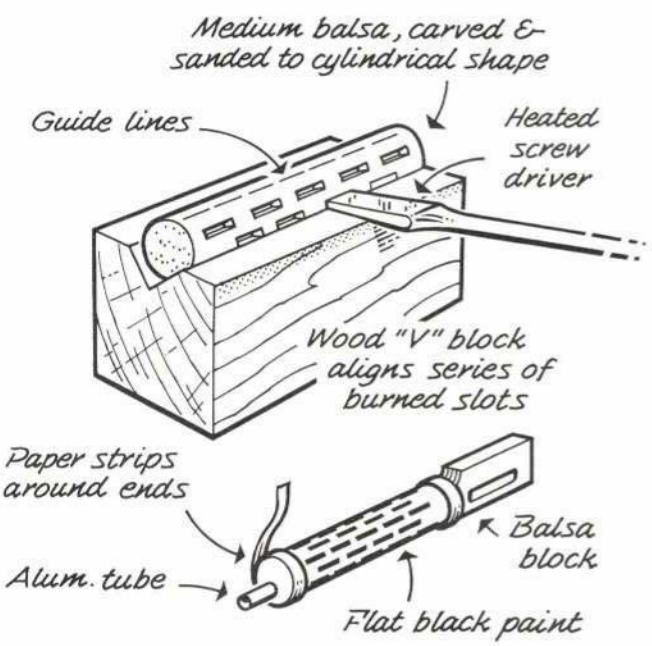
Have a new idea for construction, adjustment or operation of model aircraft or RC? AM pays $10 for each 'hint & kink' used. Send rough sketch and description to Sketchbook, c/o American Aircraft Modeler, Potomac Aviation Publications, Inc., 1012 14th St., NW, Washington, D. C. 20005.



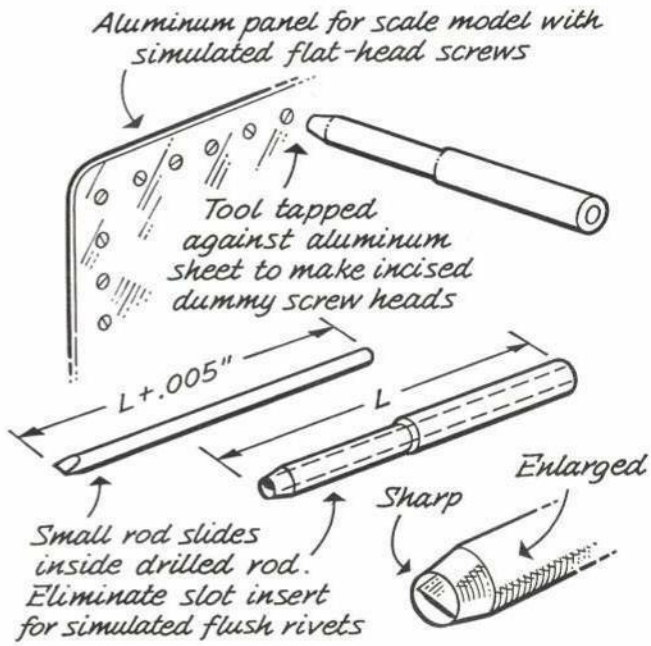
SERIES of alligator clips soldered to individual copper wires and held in bench vise serves as versatile holding device for soldering or cementing multiple part units. Submitted by Jack E. Jowett, Fairview Park, Ohio.



PROPER CG location is important for safe test flight says Clyde E. Lower, Gainesville, Fla. Piano wire is passed through fuselage at desired CG location; model suspended by string from wire, parts installed to balance as needed.



BOB MEUSER, Oakland, Calif., builds realistic WW I machine gun barrels of balsa. Air vents along barrels are burned into balsa cylinders with heated screwdriver tip using wood block as spacing guide.



ACCURATE tool for incising realistic, miniature flush screw heads or simulated rivets in aluminum sheet is idea of J. Warren Kohler Sr., Glen Head, N. Y. Parts machined from drill rod and hardened. Even rows in panels quickly made.

MAY, 1968

model aviation

Official magazine of the Academy of Model Aeronautics • 1239 Vermont Avenue N.W., Washington, DC 20005

Flight Records for Prestige and a Measure of Achievement

What makes the world go 'round is different people doing different things. Some modelers get their kicks out of showing off a magnificient construction job, even though the model may never be flown. Others could care less how a model looks as long as it flys nicely and dependably; maybe they'll never even enter a contest. A special breed goes for contests — the spirit of keen rivalry is the thing with them. Another group, which also includes the contest goers, are the modelers who try for AMA National Records. Vive le difference!

When a modeler tries for a National Record his sights are set in a somewhat different direction than the contest flyer. The contestant is trying to outdo all his opponents at a particular contest (quite an achievement at a large AAA contest or the National Championship), but the modeler trying for a national AMA record must better the flight performance of others like himself, both in age and model type, from all over the nation.

The rewards? Not much in material gain, but in self-esteem, pride, and recognition — plenty. Each record setter is awarded a handsome certificate (which is usually framed by the recipient and displayed prominently for many years) on which is indicated the name of the flyer, the model category, performance achieved, and the date the record was established. Information about record setting models and modelers is published as often as practical. Behind the scenes, your AMA has information in its archives about most all record holders, past and present.

Setting a record: Besides having an outstanding model the first step is to obtain the AMA Sporting License (a privilege of AMA membership). The license is the same as that required to enter AMA-sanctioned contests and Record Trials, the only activities from which flights can be authenticated for national records. Licensees receive with their AMA credentials the Official Model Aircraft Regulations which explain in detail all the specifications with which each type of model must conform, as well as the criteria by which each type of model's flight performance is judged. In all cases for a National AMA Record, the rules for competitions and records are identical.

Where to go: Look among these pages for the Contest Calendar. Better yet, join a local AMA Chartered Club so you will be in a position to see AMA's monthly mailing which always includes a more completely detailed and more up-to-the-minute contest calendar. Flight performance of all recognized categories of models accomplished at Record Trials, Class A, AA, AAA, and AAAA Meets are equally considered for National AMA records, except that Control Line Speed records may be set only at Class AA, AAA, and AAAA Meets.

Procedure: At the contest no special notification need be given that you are trying for a record if your model's category is a scheduled event. Just enter the contest, have your model's specifications checked (processed) as necessary, and do your best to turn in some really outstanding flights. Both the flyer and the Contest Director probably will have a good idea of the kind of flights necessary for a record; however, don't rely completely on the Contest Director to seek you out. He will have a myriad of details on his mind. When you have turned in an outstanding flight score seek out the CD and, jointly, fill out the AMA record application form which he will have (provided in each CD's sanction kit). Besides rudimentary information the modeler and CD will have to supply, each record application must be accompanied by a three-view drawing of the model when it is not a kit or published design. No fee is necessary to file for National AMA Records.

The easy way: Most likely the hardest-to-beat records will be those in categories which are the most popular. A category having 5,000 flyers is apt to have a harder to beat record than one in which there may be only 200 flyers. Or if a record category has been in existence for a long time, the same thing may apply. Therefore, the shortest road to a National Record may be by using a model type that has relatively minor popularity. Young modelers, especially, should note that records in many of the Junior and Senior age categories are likely to be within reach with sometimes just a little extra effort. Within most model categories, records are separated into AMA age classes of Junior, Senior and Open so that one age class does not compete with another.

New record possibilities this year: Whenever rules for a new class of model are adopted by the AMA Contest Board there usually is a flurry of activity by modelers trying to set records. This is because, in these cases, records start fresh — even the most meager performance will set a record

Continued on page 44

Careful supervision of flights at AMA sanctioned contests assures that outstanding flights can be considered for national record recognition. Here, Bill Mette's (Campbell, Calif.) Class C free flight Starduster is shown on its way. His flights were 5:00, 5:00, 5:00, 6:00, 7:00, 8:00, 9:00, 10:00 and 3:28.9, for a total of 58 minutes, 28.9 seconds. Record was set during 1967 National Contest. A number of records are likely to be broken this year at the Nats at Olathe, Kan., August 3-8.

National AMA Records as of Feb. 15

(Complete except for Indoor, to be published later)

FREE FLIGHT

½A Gas	Time
J — Walter Lee	28:00.0
S — Walter Prey	30:05.0
O — Daryl Farnsworth	57:34.0
½A Gas ROW	
J — Paul Ferguson	6:26.0
S — (no current record)	
O — Natko Antonioli	13:37.0
A Gas	
J — Sam Sciacca	31:48.0
S — Jack Christiansen	33:28.0
O — Amos Kleinsasser	51:24.0
A Gas ROW	
J — (no current record)	
S — Dennis Matsuda	11:51.0
O — Natko Antonioli	14:52.0
B Gas	
J — Dennis Matsuda	27:38.0
S — Mike Achterberg	31:15.0
O — Robert Cherny	70:07.0
B Gas ROW	
J — (no current record)	
S — (no current record)	
O — (no current record)	
C Gas	
J — Fred Anderson	49:59.0
S — Larry Kimrey	21:00.0
O — William Mette Jr.	58:28.9
C Gas ROW	
J — (no current record)	
S — (no current record)	
O — (no current record)	
FAI Power	
J — (no current record)	
S — (no current record)	
O — (no current record)	

Rocket	Time
J — Dan O'Malley	8:02.6
S — Daniel Tracy	13:40.0
O — Ramon T. Hansen Jr.	13:00.0
Wakefield	
J — (no current record)	
S — (no current record)	
O — (no current record)	
Unlimited Rubber	
J — (no current record)	
S — (no current record)	
O — (no current record)	
Unlimited Rubber ROW	
J — (no current record)	
S — (no current record)	
O — (no current record)	
H. L. Glider	
J — Dan Keller	11:35.8
S — Tim Batiuk	16:53.0
O — Ron Wittman	19:32.0
A-1 Towline Glider	
J — Kurt Smitz	14:08.0
S — Dennis Bronco	13:19.2
O — Howard Harvey	20:09.0
A-2 Towline Glider	
J — (no current record)	
S — (no current record)	
O — (no current record)	
Outdoor Autogiro	
J — Kent A. Britain	12.8
S — David Ullman	3:10.3
O — William R. Bigge	3:39.0
Outdoor Ornithopter	
J — David Erbach	57.4
S — Edmund Smith	2:57.9
O — Jerald B. Murphy	6:13.0
Outdoor Helicopter	
J — Norman Furutani	10:06.0
S — Edmund Smith	3:49.0
O — Thomas Finch	14:57.0

CONTROL LINE

Endurance	Time
J — Jerry Baxter	2::08:45
S — Louis Meden	3::01:7
O — James A. Wilson	3::40:37
½A Speed	**M.P.H.**
J — Danny Wakerley	105.96
S — Dubby Jett	106.34
O — Warren Kurth	112.46
A Speed	
J — Mary Lou Brown	146.24
S — Dubby Jett	149.69
O — Wisniewski & Theobald	162.67
B Speed	
J — Danny Wakerley	165.53
S — John Deaton	165.07
O — Theobald & Wisniewski	182.67
C Speed	
J — Mary Lou Brown	171.69
S — Dubby Jett	178.15
O — Theobald & Wisniewski	192.24
Jet Speed	
J — Jack L. Olson	156.60
S — Glen E. Payne Jr.	159.79
O — Thomas & Fisher	179.93

Proto Speed (B)	M.P.H.
J — Stephen Mueller	130.86
S — Dubby Jett	135.95
O — Jim Delaney	151.20
Proto Speed (½A)	
J — Alan M. Nixon	85.68
S — Bruce Tunberg	87.09
O — Bussell & Jett	95.76
Navy Carrier Class I	**Points**
J — John Gerber	447
S — Albert Stanczyk	494.34
O — Donald H. Gerber	541
Navy Carrier Class II	
J — (no current record)	
S — (no current record)	
O — (no current record)	
Profile Proto Speed (½A)	**M.P.H.**
J — William Fisher	83.69

RADIO CONTROL

Pylon	Time
J — John R. Jennings	1:10.8
S — Gary McDaniel	1:37.6
O — Austin Leftwich	48.0

Records (Cont.)

if it is first. And if the Contest Board should alter existing rules substantially, so as to make performance unequal, this also creates a fresh set of record possibilities. For 1968, the new record openings created by changed rules are the FAI free flight classes of Wakefield Rubber, A-2 Towline Glider and FAI Power; the AMA Unlimited Rubber class; and Class II Navy Carrier. Here, the new FAI openings are applicable because the new rules base scoring on seven flights instead of five as was the case formerly. Unlimited Rubber now is scored on the basis of progressive fly-offs instead of a single, unlimited, fly-off as before. Minimum line diameter for Class II Navy Carrier was increased from .016" to .018".

Records only for timed models: National AMA records are recognized only for the kinds and classes of models whose performance can be judged by a watch. Models which are raced or flown against one another are not eligible for record recognition and neither are models judged visually such as aerobatics (RC and CL) and scale.

NATS Dates Changed

Notice was given in the April Model Aviation of a change in the dates of the 1968 National Model Airplane Championships from the dates first announced. Mark your calendar: August 3 through August 8 for the Nats to be held this year at NAS Olathe, Kansas (just a short distance southwest from Kansas City).

This year, unlike previous years, the National Contest will begin on a Saturday and close on a Thursday. Contestant registration will be held on the 3rd and/or the 4th, together with model processing. The Navy, host to the Nats, will put on a spectacular public air show on the 3rd and 4th featuring the famed Blue Angels. Even with the turned-around Nats schedule (air show at the beginning instead of end), planning is going forward to provide at least four days and perhaps the equivalent of five normal Nats days of model flying.

Housing for Junior and Senior age class entrants will be available. Such housing is expected to be available to Open age entrants who bring with them Junior or Senior flyers. And for the first time in many years the Navy is expecting to provide a site aboard the Olathe Naval Air Station for camping.

The planning cooperation and enthusiasm of the Navy officers and men at NAS Olathe has been splendid, all pointing to the prospects of the 1968 National Contest being truly outstanding. Any modeler who possibly can should plan to attend. While entry blanks, with full particulars, are not ready, you can be sure of getting one at the earliest possible time by writing for one now. Send your request, including a stamped, pre-addressed envelope to AMA Headquarters, 1239 Vermont Ave., N.W., Washington, D.C. 20005.

RC was in its infancy when this shot was taken at 1948 Olathe Nats. Official US Navy photo.

AMA Now Tax Exempt

It may not seem like big news to the average AMA member — it won't affect his building and flying — but to AMA's officers and Headquarters staff it is big news that the Internal Revenue Service has officially recognized AMA as being entitled to tax-free privileges. This means that contributions to AMA are tax-deductible. The IRS indicates that its action is retroactive; donations made in 1967 are deductible as are those made this year and in the future.

Hopefully, some old-timers who have enjoyed many years of model aviation may be inclined to contribute something to assure the perpetuation of the activity for new generations to come. In its letter to AMA the IRS says that "Bequests, legacies, devises, transfers, or gifts to or for your (AMA) use are deductible for Federal estate and gift tax purposes."

In 1948 at Olathe, Kan., Steven Jordan, 13, was shown with his record-breaking Class B controlliner. The Junior record then was 112.5 mph; in early 1968 it was over 165. With Steven was Nats host, Vice Admiral R. F. Whitehead, Chief of Naval Air Reserve Training. Official U.S. Navy photo.

FAI RC Team Program

The three-man team to represent the United States in the World Radio Control Championships in 1969 will be selected this year at the National Model Airplane Championships, Olathe, Kansas, August 3-6. The World RC Championships is planned for Germany in 1969.

Prior to the National contest, fifteen regional model meets will be authorized to participate in the program. These will be spread geographically throughout the country according to activity and will use either the FAI pattern or the Class C Expert pattern. The fifteen regional winners will be qualified to compete in the team finals at the Nats.

During the early days of the National Contest there will be additional qualifying trials using the FAI maneuvers. The top fifteen Nats qualifiers, together with the fifteen regional qualifiers and the 1967 team (automatically qualified), will compete for the three team spots in the team finals to be staged during the latter part of the National contest.

Flyers who wish to try for the RC team must preregister by sending a $5 program entry fee to AMA Headquarters. This must be postmarked by midnight prior to the qualifying meet being entered — only exception is for the Nats qualifying trials: entry fees will be accepted at Nats AMA HQ up to the time of regular Nats registration cutoff.

At press time the location and dates of qualifying meets had not been finalized, but this will have been done by now. Anyone may obtain the list by sending a stamped and self-addressed envelope to AMA HQ. And those who preregister will automatically be sent the list. HQ is accepting preregistrations now. Check or money order should be made out to AMA (FAI RC Qual.). Contestants are also required to have an FAI stamp. Those who do not already have one should send an additional $1.25 at the time of preregistration.

The qualification program is designed to provide, if possible, a meet within a day's driving distance of most AMA members. But members will be free to try to qualify at any or all meets so that if they don't make it at one they can try another.

Program administrator is John Patton, Rt. 5, Frederick, Md. 21701.

CIAM Meeting in Hungary

The meeting of the international model aircraft committee of the Federation Aeronautique Internationale (CIAM) held late last October in Budapest, Hungry, produced no changes to model specifications for international and World Championship competitions. There were some changes to the rules, however, which will affect flying in international meets.

Free Flight: Especially noteworthy is a rule change applicable to Wakefield Rubber, A-2 Towline Glider, and FAI Power. The number fo official flights is increased from 5 to 7. Tie-breaking conditions remain unchanged, except that for fly-offs a four-minute period will be established during which the competitor must tow his model, wind his rubber motor or start his engine and launch his model. No official limit was set previously, although such a limit was employed.

In timing, a new rule is put in effect: "If the model disappears behind some obstacle or in clouds the timekeepers are allowed to wait for a maximum of 10 seconds. Should the model not reappear, timing will cease and the 10 seconds will be subtracted from the time of flight."

Indoor: In addition to being able to steer models with a balloon, previously allowed, indoor flyers now are also permitted to steer their models with a stick two to eight meters in length. Irrespective of whether a balloon or stick is used for steering, the number of times the model may be steered is increased from two to three, and the length of time allowed each steering effort is increased from 10 to 15 seconds.

Italy will host the 1968 World Championships at the Palace of Sport, Rome, probably October 3-6.

Radio Control: The committee voted unanimously to keep model specifications and maneuvers unchanged. However, the CIAM did decide to allow each contestant just one attempt for each of the three official flights allowed. Formely two attempts were allowed for each official flight.

Not decided yet, but under consideration, is the possibility of organizing a scale event during the 1969 RC World Championships. Another item under consideration is the possibility of allowing more flights; if the RC subcommittee's study should bring about a favorable report, this could be acted upon before the 1969 Championships.

Officially adopted was the proposal of CIAM President Rudy Beck (Hungry) to establish an "International Judge Certificate." Such certificates will be bestowed upon persons who attend a special training session this spring in Germany. The two delegates tentatively approved to represent the United States will be Bill Northrop and John Patton. Idea is to make judging of maneuvers more consistent and uniform. Only those with the certificate will be allowed to score maneuvers in World Championships. A similar program will, most likely, be initiated for Control Line Acrobatics.

Control Line: The next Control Line World Championships will take place in Helsinki, Finland, during the second half of August, 1968, it was reported. The U.S.A. teams for Speed, Acrobatics, and Team Racing have already been selected, as was reported in the February 1968 issue of Model Aviation.

The CIAM meeting was attended by 16 member-nations of the FAI. The U. S. was ably represented by AMA leaders Maynard Hill (Chief Delegate and RC Subcommittee chairman), Robert Champine (FF Subcommittee member), and AMA Technical Director Frank Ehling. Also in attendance, but not as an AMA representative, was Dr. Walter A. Good, Honorary President of the CIAM.

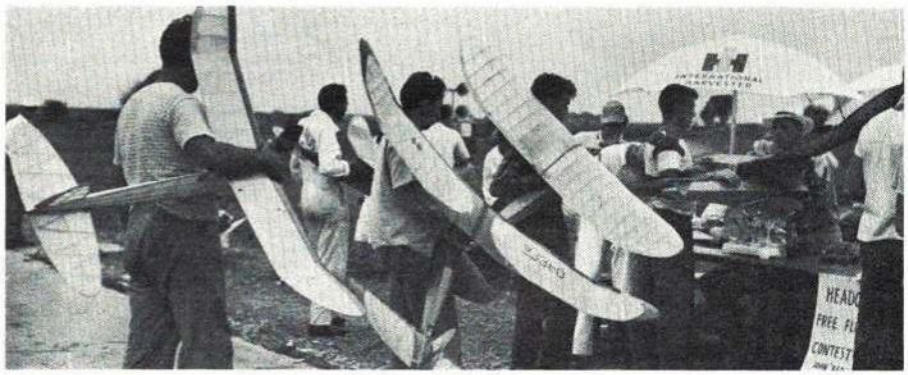
New CL CB Chairman

Howard Mottin, district VII (Michigan) was appointed by AMA President Weirick to replace John Barr — John has retired as chairman but is continuing as district X CL CB representative. Mottin has already gotten to work by issuing a first call for board comments on various proposals which are intended to clarify confusion resulting from 1967 action on speed rules. The goal is to get the board working early so that by Nats time final votes may be taken on rules for 1969.

Mottin also advises all concerned that Contest Board procedures call for getting proposals in by April, for any that are to take effect the following year. His address is in the AMA Officer Directory in every issue of the Model Aviation section of American Modeler.

Rule Book Error

RC Scale. On page 39 of the 1968 Official Model Aircraft Regulations it says that the use of large engines is limited to AAA or larger meets. Not so. This was changed by the '67 RC Contest Board so that use of large engines at any sanctioned meet is okay. To correct the rule book, change paragraph 7 under rule 24.1 to delete the words, "AAA or larger," in the last sentence of that paragraph.



The Olathe Nats 20 years ago! This year's Nats may see the 1948 scene above repeated when the Old Timers get together. Some of the same people shown will probably be involved. The Nats hasn't been at Olathe since 1949, so for many returnees it will be a childhood revisited.

DIRECTORY OF AMA OFFICERS

Which officers live in your district? Select correct address when writing officers.

EXECUTIVE COUNCIL

President:
C. G. Weirick, 3775 Hughes, Apt. 4, Los Angeles, Calif. 90034.

Secretary-Treasurer:
Earl Witt, Longview Trailer Court, R.D. #3, Chambersburg, Pa.

Executive Director
John Worth, c/o AMA Hq., 1239 Vermont Ave. N.W., Washington, D. C. 20005

Vice Presidents:
I: Cliff Piper, Highland Road, Atkinson, N. H.
II: A Schroeder, 18 Spencer Rd., Glen Ridge, N. J.
III: Eva Biddle, 2156 Street Rd., Warrington, Pa.
IV: C. Telford, 8612 Rayburn Rd., Bethesda, Md.
V: Jim Kirkland, 344 Edge Ave., Valparaiso, Fla.
VI: W. Weaver, 7248 Winchester Dr., St. Louis, Mo.
VII: Jack Josaitis, 10382 Elmira, Detroit, Mich.
VIII: L. Peters, 3025 Hillglen Rd., Dallas, Tex. 75228
IX: Stan Chilton, 446 Ida, Wichita, Kans.
X: J. Pond, 2162 43rd Ave., San Francisco, Calif.
XI: R. D. Stalick, 2807 S. Oak St., Albany, Ore.

CONTEST COORDINATORS:

I: W. Leonhardt, 100 Abbott St., Lawrence, Mass.
II: E. F. Hoffman, 158 Carpenter St., Belleville, N.J.
III: E. Biddle, 2156 Street Rd., Warrington, Penna. 18976 (East)
M. Weisenbach, 4568 West 146th St., Cleveland, Ohio 44135 (West)
IV: D. L. Johnson, 3367 Sudlersville So., Laurel, Md.
V: T. McLaughlan, 741 W. Hernandez St., Pensacola, Fla 32501
VI: Gosta Johnson, 6810 S. Crandon, Chicago, Ill. 60649
VII: Odell Marchant, 2004 N. Hillsboro, Minneapolis, Minn. 55427 (North)
W. Hartung, 14759 Kilbourne, Detroit, Mich. 48213 (South)
VIII: M. Frank, 2933 Blankenship, Wichita Falls, Tex. 76308
IX: R. R. Combs, RR #1 Box 712, Morrison, Colo.
X: D. C. Farnsworth, 301 Carl Dr., Visalia, Calif. 93277 (North)
Pete Brandt, 5817 W. Ironwood, Palos Verdes Peninsula, Calif. 90274 (South)
XI: A. L. Grell, Rt. 1 Box 165, Tangent, Ore. 97389

CONTEST BOARD COORDINATOR: Pete Soule, 26622 Fond Du Lac, Palos Verdes Peninsula, Calif. 90274

Bold type below indicates Chairman of Contest Board.

FREE FLIGHT CONTEST BOARD:

I: Henry Struck, R.F.D. #2, Hamburg, Old Lyme, Conn.
II: E. Fronczek, 34-14 Broadway, Long Island City, N. Y. 11106
III: Robert Leishman, 167 Goldenridge Dr., Levittown, Pa.
IV: J. V. Boyle Jr., 219 Shenandoah Rd., Hampton, Va. 23361
V: Jerry Wagner, 274 E. 9th St., Hialeah, Fla.
VI: E. D. Capogreco, 1423 Andrews, Cahokia, Ill. 62206
VII: P. W. Klintworth Jr., 894 Brooklawn Rd., Troy, Mich. 48084
VIII: **R. Tenny, 432 Lynn St., Richardson, Tex. 75080**
IX: Frank Monts, 6519 Marjorie Lane, Wichita, Kans.
X: V. Cunnyngham, 4337 Hornbrook St., Baldwin Park, Calif. 91706
XI: D. Sobala, 12003 S.E. Taylor St., Portland, Ore.

CONTROL LINE CONTEST BOARD:

I: D. K. Cook, 148 Belair St., Brockton, Mass. 02401
II: J. G. Pailet, 30 Emerson Rd., Brookville, Glen Head, N. Y. 11545
III: Laird Jackson, 5415 Houghton Pl., Philadelphia, Pa.
IV: H. Larsen, Rt. 1, Box 30705, Manassas, Va.
V: W. D. McGraw, 1325 Carol Dr., Memphis, Tenn.
VI: R. G. Marek, 1003 Tacoma St., Carpentersville, Ill.
VII: **Howard Mottin, 2124 Common Rd., Warren, Mich.**
VIII: G. M. Aldrich, 3219 Shady Springs, San Antonio, Tex. 78230
IX: J. R. Mason, 2214 S. Pine Crest, Wichita, Kans.
X: J. E. Barr, 7418 Collett Ave., Van Nuys, Calif.
XI: Keith Loutocky, 1419 S. 48th, Tacoma, Wash.

RADIO CONTROL CONTEST BOARD:

I: H. A. Thomasian, 369 Brigham St., Northboro, Mass. 01532
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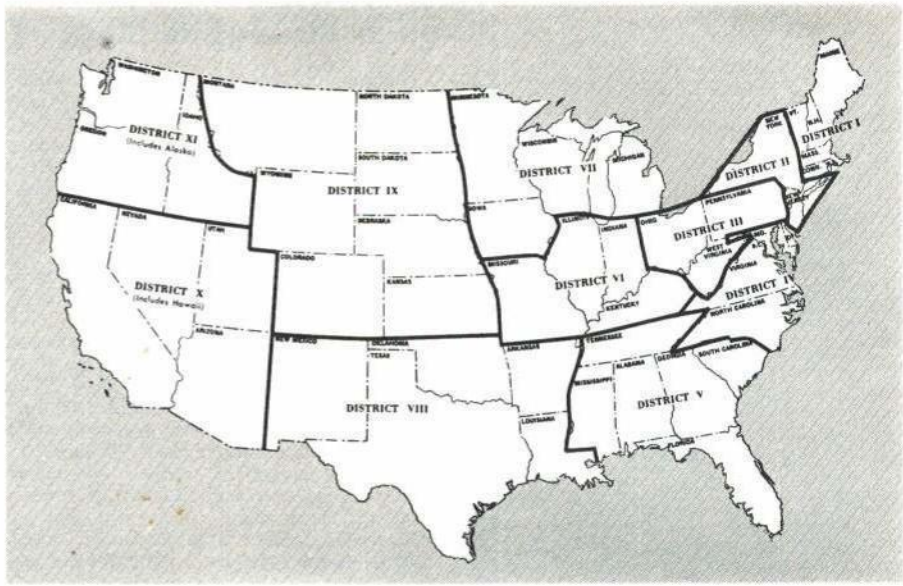
IV: W. C. Northrop Jr., 56 Holly Lane, Newark, Del.
V: Don Coleman, P.O. Box 436, Citronelle, Ala. 36522
VI: Bud Atkinson, 734 North 6th St. Terr., Blue Springs, Mo. 64015
VII: Loren Tregellas, 3003 S. Everett, Wichita, Kans.
VIII: C. Summers, 7132 Shook Ave., Dallas, Tex.
IX: James E. Northmore, 28207 Grand Duke, Farmington, Mich.
X: **G. E. Nelson, 8638 Patterson Pass Rd., Livermore, Calif. 94550**
XI: R. Brooke, 17845 3rd Ave. S.W., Seattle, Wash.



CONTEST CALENDAR

Official Sanctioned Contests of the Academy of Model Aeronautics

March 17 — Taft, Calif. (AA) Texaco Tryout for Texaco Gas. Site: Gardner Field. S. Taibi CD, 4339 Conquista Ave., Lakewood, Calif. 90713. Sponsor: SCAMPS.

March 24 — Sacramento, Calif. (AA) Northern California FF Council Meet. Site: Sunrise Ave. & Jackson Rd. J. Pond CD, 2162 43rd Ave., San Francisco, Calif. 94116. Sponsor: S.F. Vultures.

March 24 — E. St. Louis, Mo. (AA) MDC Annual Indoor Contest. Site: Armory. A. Signorino CD, 11959 Glenvalley Dr., Bridgeton, Mo. 63042.

March 31 — Fresno, Calif. (A) Fresno Monthly FF Meet. Site: Near Kerman. F. Gallo CD, 1725 Kenmore Dr. W., Fresno, Calif. 93702. Sponsor: Fresno Gas Model Club.

March 30-31 — Pittsburgh, Pa. (AA) 4th Annual Allegheny Indoor Air Meet. Site: Pitt Univ. Field House. R. Pennetti Jr. CD, 3918 Brandon Rd., Pittsburgh, Pa. 15212.

April 6-7 — Palm Springs, Calif. (AA) Palm Springs RC Air Races. Site: Airport. R. Seale CD, 18073 Vine St., Fontana, Calif. 92335. Sponsor: M.A.R.K.S.

April 7 — Taft, Calif. (AA) Texaco Annual FF Gas Meet. Site: Gardner Field. S. Taibi CD, 4339 Conquista Ave., Lakewood, Calif. 90713. Sponsor: SCAMPS.

April 14 — Hampton, Va. (A) Brainbusters Annual Spring Indoor Meet. Site: Willis School. D. Orr CD, 320-D 73rd St., Newport News, Va. 23607. Sponsor: Brainbusters Model Club.

April 20-21 — Sebring, Fla. (AAA) Florida State Championships for FF, CL. Site: Airport. J. Wagner CD, 274 E. 9th St., Hialeah, Fla. 22010.

April 20-21 — Winter Park, Fla. (AA) Fla. State RC Championships. Site: RCACF Field. W. Schoonard CD, 2080 Sharon Dr., Winter Park, Fla. 32789. Sponsor: Remote Control Assn. of Central Fla.

April 21 — Fresno, Calif. (A) Fresno Monthly FF Meet. Site: Near Kerman. F. Gallo CD, 1725 Kenmore Dr. W., Fresno, Calif. 93702. Sponsor: Fresno Gas Model Club.

April 21 — Detroit, Mich. (AA) Strathmoor Spring CL Contest. Site: Rouge Park. A. Adamisin CD, 22454 Fairfax, Taylor, Mich. 48180. Sponsor: Strathmoor Model Club.

April 27-28 — Tacoma, Wash. (AA) Mt. Ranier RC Open Meet. Site: Club Flying Field. E. Avera CD, 400 E. 7th St. S.W., Tacoma, Wash. 98439. Sponsor: Mt. Ranier RC Society.

April 28 — Sacramento, Calif. (AA) Northern California FF Council Meet. Site: Sunrise Ave. & Jackson Rd. W. Bowen CD, 1415 Midvale Rd., Lodi, Calif. 95240. Sponsor: Stockton Gas Model Club.

April 28 —— Orange, Mass. (AA) Antique Model Rally for FF. Site: Airport. L. Wellman CD, 8 Park St., Groveland, Mass. 01830.

May 4-5 — Mobile, Ala. (AA) 5th Annual Gulf Coast RC Meet. Site: Plum Forty. J. Sabine CD, 10 Maury Dr., Mobile, Ala. 36606. Sponsor: Gulf Coast RC Club.

May 12 — Tullahoma, Tenn. (AA) Coffee Air Foilers 4th Annual Old Timer's Meet for FF. Site: Air Foilers Field. M. Collier CD, 518 Sharondale Dr., Tullahoma, Tenn. 37388. Sponsor: Coffee Air Foilers.

May 19 — Baltimore, Md. (AA) 2nd Annual CL Meet. Site: Rosedale Park. L. Lauer CD, 831 Lannerton Rd., Baltimore, Md. 21220. Sponsor: Flite Streaks Model Aeronautics Club.

May 19 — Denver, Colo. (AA) Model Museum Spring Annual for Special FF Old Timer Events. Site: East Colfax Airpark. T. Dannels CD, 1265 Yates St., Denver, Colo. 80204. Sponsor: Model Museum Flying Club.

May 19 — Torrington, Conn. (AA) Balsa Bandits 6th Annual CL Meet. Site: Recreation Field. L. Abraham CD, R.F.D. 1 Gillette Rd., New Hartford, Conn. 06057. Sponsor: Torrington Balsa Bandits.

May 25-26 — Madera, Calif. (AA) Fresno Nats RC Qualifications. Site: Madera Airport. A. Chisolm CD, 615 E. Belmont Ave., Fresno, Calif. 93701. Sponsor: Fresno Radio Modelers.

May 25-26 — Chicago, Ill. (AA) 6th Annual RC Season Opener. Site: Kick-a-Poo Woods. S. Peterson CD, 6416 S. LaPorte, Chicago, Ill. 60638. Sponsor: RC Club of Chicago.

May 25-26 — Sumter, S. C. Iris Festival RC 1968 Invitational. Site: Sumter Co. Airport. Invitations available upon request from out of state modelers. S. C. modelers must belong to SCRAM. J. Bradham CD, 35 Morgan Ave., Sumter, S. C. 29150. Sponsor: Sumter MAC.

May 26 — Sacramento, Calif. (AA) Northern Calif. FF Council Meet. Site: Sunrise Ave. & Jackson Rd., W. Schnathorst CD, 647 Hunt Way, Davis, Calif. 95616. Sponsor: Capitol Condors.

May 26 — Fresno, Calif. (A) Fresno Monthly FF Meet. Site: Near Kerman. F. Gallo CD, 1725 Kenmore Dr. W., Fresno, Calif. 93702. Sponsor: Fresno Gas Model Club.

May 26 — Tucson, Ariz. (AA) Spring Invitational CL Meet. Site: Rodeo Park. T. Snow CD, 909 E. Ellis, Tucson, Ariz. 85719. Sponsor: Cholla Choppers MAC.

May 30 — Union, N. J. (AA) 14th Union Model Airplane Invitational CL Meet. Site: Swanstrom Pl. F. DeCicco CD, 53 Broadview Ave., Maplewood, N. J. 07040.

June 1-2 — Atlanta, Ga. (AA) 4th Greater Atlanta RC Meet. Site: Club Flying Site. R. Roberts Jr. CD, 2443 Woodside Way, Chamblee, Ga. 30005. Sponsor: Atlanta RC Club.

June 2 — Orange, Mass. (AA) Antique Model Rally for FF. Site: Airport. L. Wellman CD, 8 Park St., Groveland, Mass. 01830.

June 2 — New Bedford, Mass. (AA) '68 Classic CL Meet. Site: Airport. L. Gadomski CD, 62 Durfee St., New Bedford, Mass. 02740. Sponsor: New Bedford MAC.

June 8-9 — Rochester, N. Y. (AA) 8th Annual N. Y. State RC Championships. Site: Club Field. R. Edmunds CD, 1521 Mt. Hope Ave., Rochester, N. Y. 14620.

June 9 — Bryan, Tex. (AA) Houston FF Club Meet. Site: Old Bryan AFB. F. Parmenter CD, Box 523, Friendswood, Tex. 77546. Sponsor: Houston FF Club.

June 14-16 — Fletcher, N. C. 14th Annual RC/NC Invitational. Site: Old Asheville Airport. H. Stamper CD, 919 Lancaster St., Durham, N. C. 27701.

June 15-16 — Shreveport, La. (AAA) La. State Model Airplane Championships for CL. Site: Hobby Park. W. Lank CD, 9903 Witham, Dallas, Texas 75220.

June 15-16 — Pensacola, Fla. (AAA) Fiesta of Five Flags 10th Annual Meet for FF & RC. Site: RC—Corry Field; FF—USN Site 8A. T. McLaughlan CD, 741 W. Hernandez, Pensacola, Fla. 32501.

June 15-16 — Jamestown, N. Y. (AA) Meet for RC. Site: Airport. W. Johnson CD, 62 Widrig Ave., Jamestown, N. Y. 14701.

June 16 — Davenport, Iowa (AA) 11th Annual Model Airplane Meet for CL. Site: Mt. Joy Airport. H. Pohlmann CD, 720 S. Ohio, Davenport, Iowa 52802.

June 16 — Elks Grove Vil., Ill. (AA) 1st Annual Skylarks RC Meet. Site: Higgans & Rt. 53. H. Brokhof CD, 410 Nash Rd., Crystal Lake, Ill. 60014. Sponsor: Skylarks RC Club of Illinois.

June 16 — Kansas City, Mo. (AAA) Kansas City Regional Championships for CL. Site: Richards Gebaur AFB. B. Wright CD, 2818 Collin, Independence, Mo. 64052. Sponsor: Sky Devils MAC.

Tri-Pacer Trainer

Continued from page 20

as a coach. Did they have a ball! About the fifth try they tore off the rudder, but it still flew, so they kept it going until some 20 flights had gone by. I might add almost nobody noticed us, so quiet was this motor. This is credit to the muffler, since we were near many houses.

The second flying session arrived. Now we were going to try to teach our number-one girl, 6-year-old Terry, the fine art of flying. Who knows, she might be another Dawn Cosmillo! Until now she hated the noise of the big motors, but the little QZ gave her courage. Even close up, the noise was not the ear-tingling racket of the average model engine.

At first we had Terry launch the model, but within a few minutes we had some boys to help. From then on we helped on the takeoff and landing and the boys did the launching. Terry didn't solo that first day, but at least she didn't get dizzy and fall down disgracing me in front of the boys. That's not the only thing to be happy about, since I had picked a parking lot next to a lot of houses. There wasn't a sign of an unhappy person. You can well believe we are excited about this QZ motor.

If you have some kids in the neighborhood and only a small amount of building time, then Tri-Pacer is your answer. Two pieces of balsa and the fuselage is on the way. This construction combines the ease of a profile with the strength needed to keep a trainer in one piece. We bent the wing leading edge on a form, but you can use 1/8" sq. and 1/8" sheeting just as easily. Shoot for about 6 oz. as an ideal weight. It flies well on 35 ft. of .008 lines.

It is necessary to turn the cylinder to the side position, as shown in the pictures and plans. The tank on the engine is fine, but the location of both vents on top of the tank makes it a poor risk when flown inverted. The fuel pours out in a couple of laps and you are hung up with the model inverted. The fuel line in the tank must be made to stay to the outside of the circle. **This is very important and must not be forgotten.**

We prefer to begin construction with the wings because, while they are drying, the other parts can be finished. Cut the ribs from sheet and if you are forming the wing leading edge, get an old solid leading edge from a combat model and carve the new shape into it first. The wing must be built on a level surface to insure warp-free construction. We cut into one-inch pieces, a 1/2" x 3/8" strip, and these pieces were then used as blocks to jig the wing. The forming of the leading edge is done with an Ace bandage. We had seriously considered a styrene plastic wing for this ship, but were not able to work out details of production.

The fuselage is about as basic as a profile-type, but much stronger. Cut the sheets to shape and carve the bottom to near finished form. Be sure to check the centerlines on the wing, stab, and engine; these are critical, if you expect to stunt the model. We prefer a white glue for the engine mounting, and have found that these areas stand up far longer if soaked with white glue before finishing.

The finishing can be done with two or three coats of clear dope sanded, followed with two coats of red dope. Sand a little on the rough edges, and then mask off the black areas. The Wondercal decals will do well for the numbers on the wing and fuselage, with only a light coat of clear dope on top to hold them down.

Tri-Pacer was designed to provide for the maximum flying time with a minimum of building.

model rocketeer

NATIONAL ASSOCIATION OF ROCKETRY

1239 Vermont Avenue NW, Washington, DC 20005

NAR

WAMARVA MOVES AHEAD

A concerted effort to form a *working* regional model rocket group within the NAR has met with success. WAMARVA (Washington-Maryland-Virginia) Group of chartered NAR sections has established a 12-month program of events that began with a Model Rocket Symposium held at the NASA Goddard Space Flight Center, January 27.

The day-long symposium featured lecture-discussions on aerodynamics, theodolites and tracking, scale model construction, NAR competition rules, and range operations.

Each of the sections has been made responsible for an area or regional meet or a non-flying get-together. Besides the meets and symposiums, tours of "space-age" sites and facilities are also planned.

Rather than being loose-knit like many other regional model rocket groups, WAMARVA has gone ahead with a well organized Action Advisory Board and not only has laid out the year-long schedule of events, but is already locking in regional model rocket meet sites. WAMARVA will also provide assistance to other model rocket groups wishing to affiliate with the NAR.

The first regional meet is expected to have over 100 participants. WAMARVA news will, at first, be published in the NARHAM Section's newsletter. The future may well see a special WAMARVA Group newsletter.

Such action by regional modelers can serve as an outstanding example of what can and should be done by other regions to strengthen the NAR and modeling in general.

HOUSTON AREA MOVES AHEAD

Bob Jones, of the NASA Manned Spacecraft Center, reports that two sections are going strong in the Houston, Tex. area and another section will be formed shortly. Bob feels that a group similar to the WAMARVA is just a matter of time in Houston. How about you sections in the the N. Y.-Connecticut, southern California and Illinois-Indiana area doing the same?

MEMBERSHIP RENEWALS

NAR membership renewals really poured into Headquarters in December and early January. It was stacked up pretty high with nearly 50% of the 1967 membership renewing before January 5. It goes without saying that 1968 membership will establish a new record. This is a very healthy situation since the more membership the NAR has, the more it can do to further the cause of model rocketry in the United States.

All NAR sections should have renewed their charter by now in preparation for the 1968 contest year. Remember, chartering is necessary to obtain the general comprehensive insurance for your group. Sections must also be chartered to have their competition points validated.

NFPA COMMITTEE MEETS

The Pyrotechnics Committee of the National Fire Protection Assoc. met in New York City in January. Vernon Estes, of Estes Industries, representing the Model Rocket Manufacturers Assoc., presented a number of changes to the tentative Code for Model Rocketry drawn up by the committee last year. A number of changes were approved by the committee.

Launch site approval by a local civil authority and adult supervision were kept in the code despite the efforts of Mr. Stine and Mr. Estes. The final changes will be made and submitted to the national convention of the NFPA in Atlanta, Ga. in May.

ANIMAL FLIGHTS

Here we go again! It is the policy of the NAR that it will not support or condone the launching of mammals in model rockets. Please don't keep asking us for permission to launch a rat or hamster or what have you. The decision, made several years ago, was based on an opinion that to obtain a truly scientific result would require equipment so costly and weighing so much that it would not classify as a model rocket flight (16 oz. total weight).

It's been said you can obtain about the same result by grabbing a mouse by the tail, swinging him around your head a few times and throwing him against a wall.

It is highly unlikely that *you* could walk through a maze, in record time, if you took the same beating.

KUDOS TO CALIFORNIA

Despite all the problems that model rocketers have faced in California during the past five years, the activity is forging ahead on all fronts. Larry Holliday, of Huntington Beach, has been joined by a number of other top flight senior advisors to keep the models flying.

Recently, Doug Malewicki, a NARAM-9 winner and aeronautical engineer, said goodbye to California and moved to Phoenix, Ariz. He has joined Centuri Engineering.

PLANS FOR MODELERS

Efforts are being made to provide scale plans of the Saturn V and the Uprated Saturn (Saturn IB) through the NAR Technical Services. The drawings have been certified by the NASA Marshall Space Flight Center.

Another set of plans for the scale modeler, soon to be made available, are for the Scout vehicle. This is a beautiful model, but marginal stability may make it a tough one to fly. The fin area is very small for a model that stands almost 3 ft. high.

LAC MOVES AHEAD

The Leader Administrative Council, elected last year at NARAM-9, is moving ahead to assist the Board of Trustees in a number of areas. The LAC, leader members from numerous sections, were delegated to work under the direction of NAR Trustee James Barrowman in an effort to give assistance to the Board and work in a variety of projects approved by the NAR President.

J. Talley Guill has prepared the new

Continued on page 48

draft of the NAR constitution and by-laws for final printing. It will be available through NARTS.

Ed Pearson is currently working on a survey of NAR members. It will query members on their modeling activities, NAR participation, educational activities and future plans.

A manual on clubs and operation of area and regional meets and associated activities is now in its initial draft. It will also cover demonstrations and local section activity suggestions. If you have any ideas or suggestions send them to LAC member, Jay Apt, 31 Stoughton Hall, Harvard College, Cambridge, Mass., 02138.

Any former NARAM R and D winner is requested to send a Xerox copy of their report to James Barrowman, 5614 Hamilton Manor Drive, Apt. #1, Hyattsville, Md. 20782. Mr. Barrowman is collecting these reports and if suitable for publication will include it in a proposed R and D Report Service.

STINE OVERSEAS

G. Harry Stine, NAR Trustee and Director of International Affairs and Standards and Testing took a quick side-trip to visit model rocket friends in Czechoslovakia in mid-February. Harry made the side-trip while attending the Winter Olympics in Grenoble, France.

The Yugoslavs have announced through the FAI that they will hold an International Model Rocket Championship Meet in 1969. The U. S. has been invited to send a representative team. Estimated cost per team member is about $600. More on this later.

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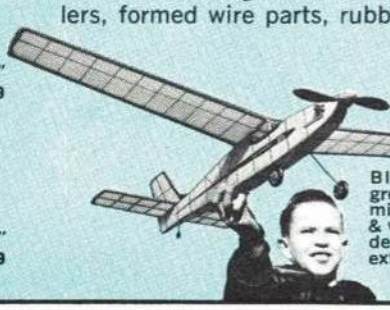

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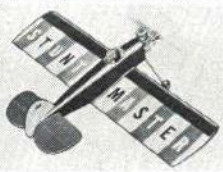

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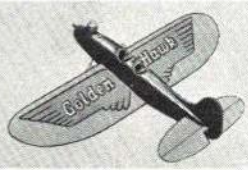

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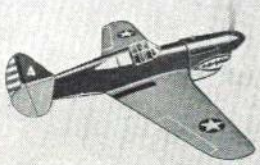

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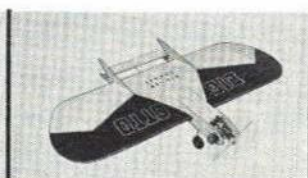

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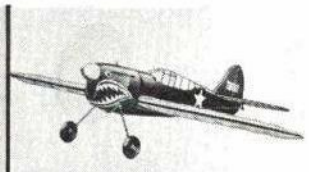

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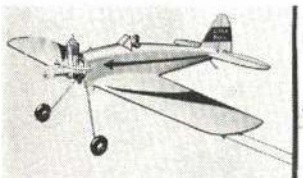

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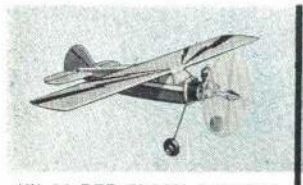

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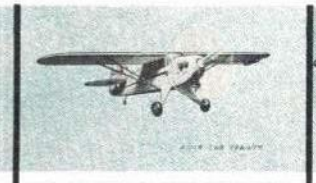

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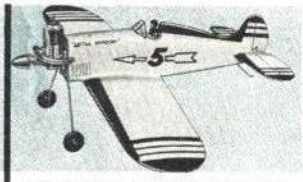

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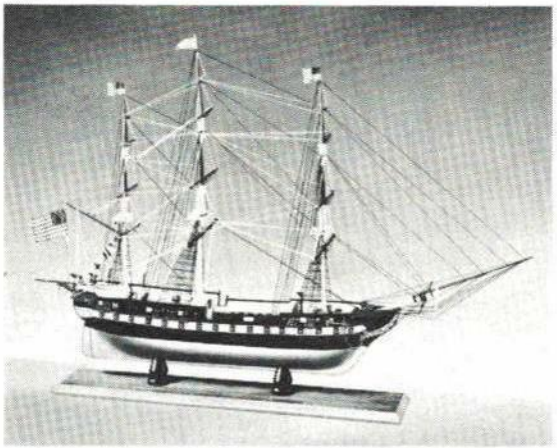

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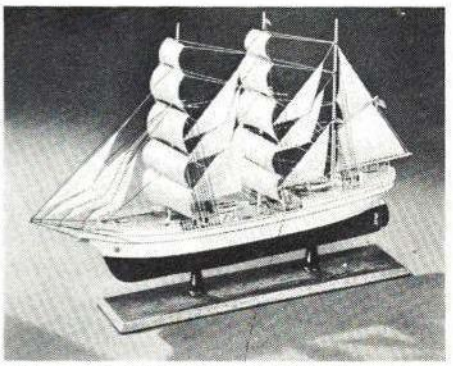

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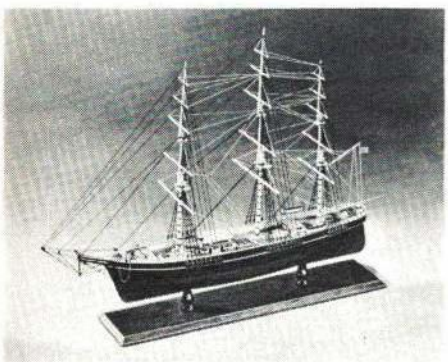

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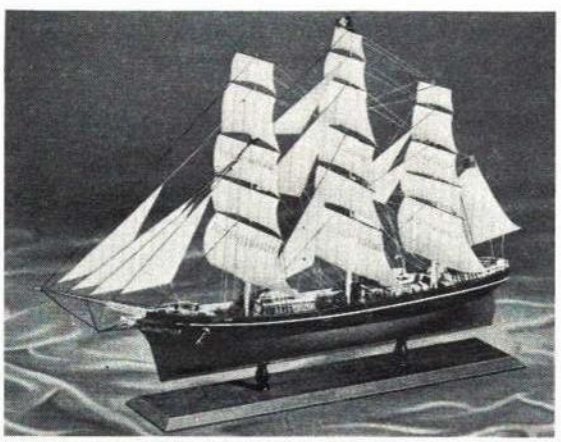

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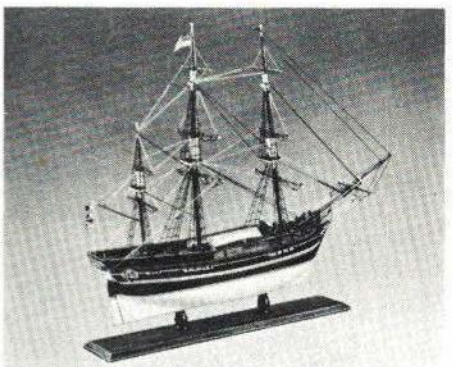

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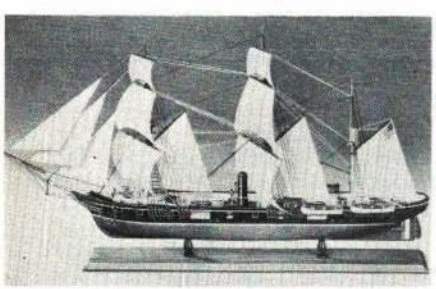

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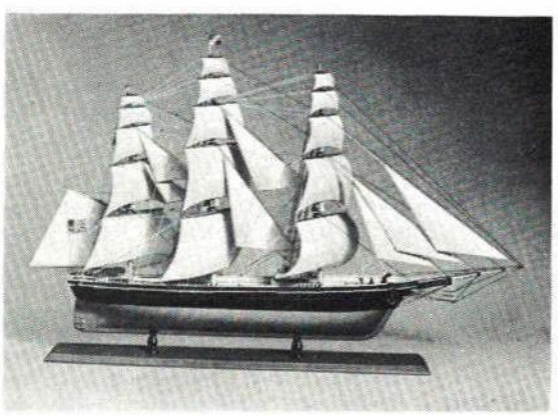

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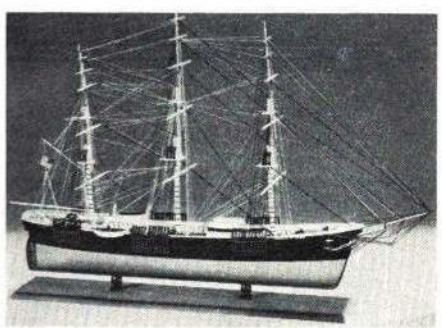

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Getting Started in R/C

Circuit Symbols — What Do They Mean? Ninth in a Series.

HOWARD MC ENTEE

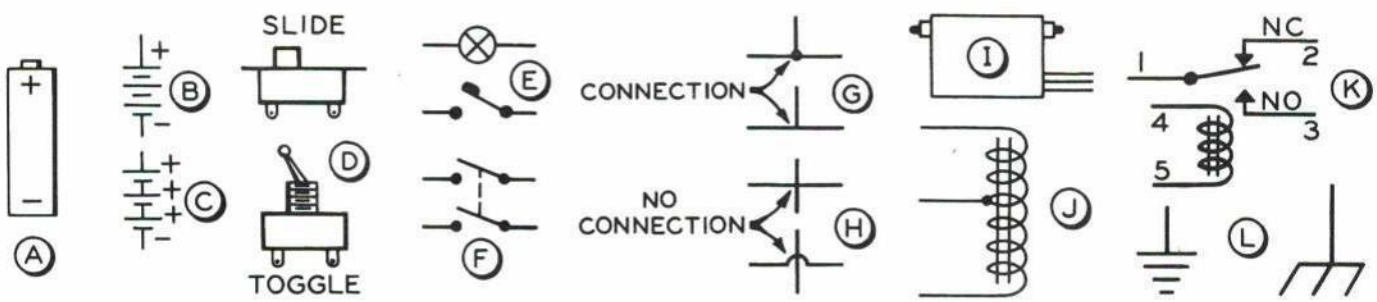
PROBABLY the majority of R/Cers today have little interest or knowledge of what goes on *inside* their R/C units. They are concerned solely with external results — how accurately the servos move in response to transmitter commands. Many would say, therefore, that they have no need whatever to read electrical and electronic circuits. But is this really true?

For those who read the instructions before hooking up some types of equipment (and this may be a small minority — but *some* people do!) a knowledge of the circuit symbols used for such hookups can be very helpful. While it is possible to draw a "hookup" of sorts by depicting simply a rough physical outline of each component — sometimes referred to as graphic or symbolic circuit diagrams — it is really much easier, quicker and less confusing to use the accepted symbol for each part.

For example, cells and batteries come in a wide variety of sizes and shapes but a simple long and a short line can stand for all types of cells, and it shows polarity as well. A symbolic hookup might show a cell as at A; it takes quite a time to draw half a dozen of these and link them up, to depict a battery of series-connected cells. But it is short work to draw the same series as in B. Really, a series of cells should be drawn as in C, and this form is sometimes utilized, but B shows the idea just as well, takes less space and is not at all confusing — to those who know circuit diagram "shorthand."

To avoid any possible confusion, the plus end of a battery is always marked with a plus sign; often a minus sign is shown at the other end just to leave no doubt. On rare occasions you might see the long line marked minus — but the polarity symbols seen at B and C are generally well accepted.

How about switches? Again, we have them in wide variety, and graphically;



Circuit and wiring diagrams are easily understood, once you know what the symbols mean. Text discusses these typical examples.

they are often depicted as at D, with a slide switch at top and a toggle below. This works all right for single pole, single throw switches (abbreviated to SPST), but when we get into multiple contacts, the circuit shorthand symbols are the only way to do it. SPST switches are normally shown as in E, and either is quite acceptable. The lower unit at E is probably the best, since we do use SPST switches in which the contacts are normally closed, and which open when the lever is moved — or a button is depressed. And incidentally, the E symbols can stand for slide or lever style switches, also for pushbutton types.

A double-pole single-throw unit (DPST) is seen in F; it's just a pair of SPST units that are operated together, indicated by the dotted line which means the two are tied together mechanically but *not* electrically.

Wires are the simplest circuit element, but even here we find some variation. Some engineers favor a connection one way (as at top) with a dot at the joint, leaving no doubt that there's a connection. Others just run the wires together less the dot. This is fine where one wire "deadends" into another as at G, but can lead to confusion when there is a crossover, as in H. Again, we see crossovers both ways (per H). If there is a connection at such a point, we favor a dot, just to make sure. And if there is *no* connection, we feel there should be an actual "jump" as at lower H. Thus, circuits in this magazine use dots wherever there is a wire connection, and a jump where there isn't. The jump can be in either lead — it makes no difference, but looks neater if they are all either vertical or horizontal.

Servos are a problem, as we have such a wide variety and some have a profusion of wires poking out. Circuits often show a rough servo outline, as in I, with color codes shown for the multiple leads. When we get into more complex circuits, the servo components must be shown individually, of course; the motor is then shown as simply a circle with a wire to each side (note the motor at righthand side of the servo circuit, Jan. '68 A. M., p. 40). In R/C work, there is often a letter in the center of the circle to indicate to what particular servo the motor belongs — E for elevator, R for rudder and so on (in the circuit mentioned, the M simply stands for "motor," meaning electric motor in this case).

A magnetic actuator has no motor, of course; there is simply a coil of wire — or sometimes two coils — and often this coil might have a center tap. The electrical portion of an Adams actuator would appear as in J; here we have a single coil, with a wire to the middle — the center-tap. The vertical lines through the coil indicate there is an iron core in the coil. This same symbolism is used for transformers (here there are two or more coils, usually with the core between them) and some form of audio chokes. RF chokes are generally shown with no core — though many today have a core of powdered iron; similar cores are often used for tuning inductors in R/C equipment, and in this case the core is shown as one or more *dotted* lines; Core lines may be shown either through the center of the coil of wire, or at one side — no difference.

The large majority of circuits show a "ground" symbol, even though no real "earth" is ever involved — as would be the case with your receiver. (Well, it wouldn't be involved unless you have a crash!) Actually, the ground symbol really means a "common connection" in the circuit; in tube circuits, battery negative (or minus) is almost always ground or common, but in transistor circuitry it could be *either* plus or minus. In any case, two main symbols are used to depict this common or ground connection, per L.

The most widely used is that at left — and note that it makes no difference how many horizontal lines are shown. More lines don't necessarily mean "more ground"! The symbol at L (right) is sometimes used; in some cases, the one at left would show an actual connection to earth (as in a ham radio transmitter), while that at right would indicate a common circuit connection to the metal frame or chassis of the transmitter. (And to confuse things, some technicians prefer to reverse the two symbols!) In a circuit, the ground symbol saves a lot of confusing wiring, since all components which go to this common point are understood to be connected to each other, when they individually run to a ground symbol.

Continued on page 54

Another symbol seen in circuitry of the components that go into a model is that of the relay. We have shown one at K — in this case, a single-pole, double-throw (SPDT) relay. Note that the same contact designations are used for relays as for switches. The coil of wire with its lines indicating an iron core is below, the movable armature is #1, the two fixed contacts are 2 and 3. Arrow heads normally indicate the fixed contacts; in this sketch, #2 is considered the "normally-closed" (or NC) contact, since it's the one that the armature is touching when there is **no current in the coil.**

With a current flow, the armature is attracted to #3; this one is known as the "normally open" contact (NO). If there is more than one moving contact, they are tied together with a dotted line, as are the multiple switch arms in sketch F, If it makes for a neater circuit diagram, a draftsman will sometimes draw the contacts of a relay at one point, and the coil elsewhere; when this is done, both parts as designated to show that they belong to the same unit.

Since we've gone this far, let's continue with this discussion next issue, including a simple circuit to show many of the parts and principles we've discussed above.

Berliner-Joyce OJ-2

Continued from page 29

1935 when the first Curtiss SOCs began to arrive.

The Curtiss machines officially replaced the B/Js on the June 1936 Fleet assignments. Two OJ-2s remained aboard the USS Langley CV-1 well into 1936 as utility planes.

Operations were equally divided between the landplane and float equipped versions during the four years of active duty in the Cruiser Divisions. During this same period several OJ-2s also served with the USS Detroit as command aircraft, Battle Force Commander of Destroyers. From 14 to 16 of the initial 18 planes built were continuously assigned and on active duty at sea. Little trouble was encountered during many flight hours either aboard ship or temporarily based ashore — a tribute to a handful of rugged aircraft and proficient pilots.

Extra observation planes were needed as more ships of the Battle Force, Cruiser Division were fitted with catapults. In 1933 nine more OJ-2s were ordered. Unfortunately, the cruiser modifications took considerably more time to complete than the manufacture of aircraft. Planes on this order were used for rotation and replacements. The picture changed completely with the advent of the Curtiss SOCs. These aircraft, with their folding wings, more easily met the new requirements that included use aboard all line ships from light cruisers to battleships. Newer ships, including cruisers, had provisions for storage of extra VSO type aircraft. Only the folding wing plane could be accommodated and the B/Js had rigid wings.

The tenth production OJ-2, BuNo 9196, was kept at the Naval Aircraft Factory and Anacostia during the early part of 1934 for possible improvements and refinements. An enclosed sliding canopy was fitted over the cockpit, a long-chord NACA cowl fitted over the engine and split trailing-edge wing flaps installed. As such, it was redesignated XOJ-3.

In March 1934, during some tests, it was involved in an accident. But the trials up to this time proved the modifications were not of sufficient value to warrant their incorporation either as in-service changes or in future production. The XOJ-3 was rebuilt as a standard OJ-2 and turned over

to the Naval Reserve at Seattle, Wash. where it served until 1940. It retained its long-chord engine cowl and cockpit canopy.

It was in 1934 that an additional 12 OJ-2s were procured. All were ordered exclusively for service with the Naval Reserve. Between 1935, when the Reserve got their first OJs, and 1938, the B/Js enjoyed their greatest years of popularity and publicity. When the Curtiss SOCs replaced the older OJs for sea duty, all the B/Js, regardless of status, were put on the inactive list and turned over to the Reserve. Because of their easy flying qualities and stable flight characteristics, many were used for instrument and blind flight training.

Since only 39 OJ-2s were built by 1937 and 33 were active with the Reserves with one at Norfolk for repair, there remained but five aircraft unaccounted for. In the fabric-covered days, a plane's useful military career seldom exceeded five peacetime years. The OJ-2s had served several years longer than usual. Considering the many and varied roles they played, this record speaks well for the design.

A long and exciting story cannot be written about the OJ-2s, since they served in the seemingly unglamorous and often routine yet valuable role of observation aircraft. To do a job well, a job that must be done, without fanfare and long pages of exciting logbook notes is tribute enough. To be remembered once in awhile as having been able to do your share is satisfaction honestly earned. The B/Js served without much notoriety and proved the possibility of using the airplane aboard light cruisers and operating in full cooperation with new fleet tactics. The OJ-2s were not unique or unusual aircraft. Their place in history is one of being simply the right airplane, at the right time to fill the right job.

The First Practical Flying Machine

Continued from page 19

Wrights had changed the position of the launching rail. They had taken the track off the hillside and laid it on level ground.

On this point, Orville years later recalled, "the track or launching rail faced into the wind on a slight incline. We wanted to make sure the craft's forward momentum and flight came from its own power and design, not taking advantage of a downhill run and gravity."

It was 10:30 a.m. by Daniel's watch when the motor sparked to life. Wilbur gave the propellers a twist to start them and they began to revolve, slowly at first, then faster and faster. The machine shook and trembled.

Then, Daniels saw Orville release the wire that held the dolly-cradle in restraint, and the machine started to move forward into the wind. Ten . . . 20 . . . 40 feet it rolled over the monorail with Wilbur running along side, holding onto one wing tip to help balance it. Then he could hold on no longer. The craft was airborne. By the time it reached the end of the track it was in free flight, and still climbing. History was in the making.

It rose to a height of about 10 feet above the observers' heads moving forward, but not at a very rapid pace in the strong wind. The left wing dipped slightly, but Orville righted it in time, leveled off. The nose pointed down, darting earthward at a rakish angle, but he made it rise again. Then, the plane dipped sharply, righted itself at the last instant, and hit the ground, landing on its skid runners and sliding to a stop — 120 feet from the spot where it had risen into the air.

The flight had lasted 12 seconds. But in that fraction of a minute, the Wrights had turned man's century old dream of powered flight from fantasy into fact. The 12 seconds ticked off a miracle, and the short distance traveled was the start of a long journey into space.

A man-made, heavier-than-air, power-driven machine had lifted itself under its own power, carrying a man into the air; had moved forward in full and controlled free flight at a sustained speed and, finally, had landed undamaged at a point of elevation as high as that from which it began its journey.

Purposely, I have **boldfaced** the above, because it is the way Orville, himself, helped me to word a description of the impact of the event. Not until they had achieved all of these things did the Wrights feel they had conquered the air.

They were very conscientious about making any claims of their progress after the Chicago speech of Wilbur's, Orville told me, and took every precaution to document and authenticate everything they did. During the period at Kitty Hawk while they were assembling the power flyer, they devised a technique to measure its performance and built a device for this purpose using a stopwatch, anemometer and motor revolution counter. The watch timed the flight. The anemometer measured velocity of the air through which the machine traveled, and the counter told them the engine rpm. This improvised instrument started and stopped automatically. When used, it gave accurately the time, wind velocity and engine rpm. They measured the distance covered with a tape measure!

Orville, one time, did some interesting doodling with figures about the first flight. The plane had traveled over the ground at a rate of 10 feet per second. Wind velocity

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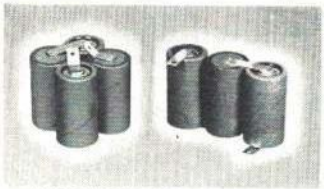

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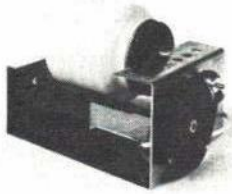

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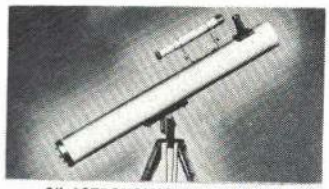

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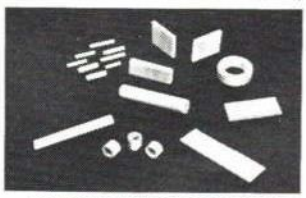

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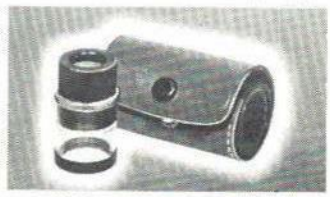

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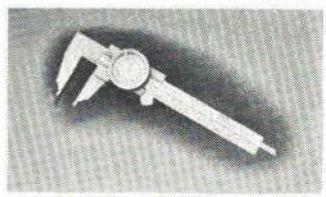

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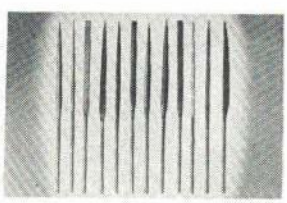

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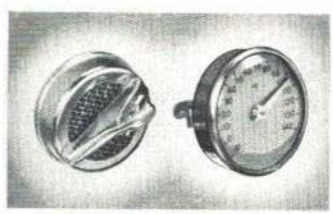

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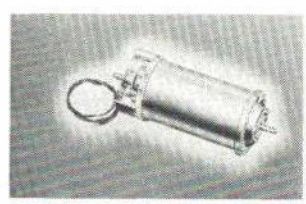

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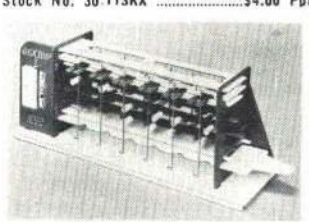

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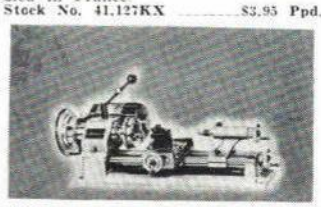

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at the time of flight was 35 feet per second. He estimated they were making about six mph ground speed, against a 25 mph wind. The first aeroplane had flown at the alarming speed of about 31 mph!

There were other witnesses to the flight besides Wilbur and John T. Daniels. Other members of the Kill Devil Life-Saving Station, W. S. Dough and A. D. Etheridge, had also come down to witness the event. W. C. Brinkley, of Manteo, and Johnny Moore, a boy from Nag's Head, were also there. Strangely enough in 1938 (35 years later) Daniels and Etheridge visited Orville, and when asked about their reflections on the historic first flight, both answered — "It seems more of a miracle now than it did at the time. Perhaps, we were too close to what was happening."

Indeed, they were very busy. The Wrights were not satisfied with making only the one flight that day. They made three more, and everybody present helped lay the track and get the machine in position each time.

The proof positive: Orville, in recalling the day he became the first to fly successfully, said that he and Wilbur, long before their first success had decided that they would not announce it to the world unless they could make several flights. He reiterated that they wanted "positive proof we had solved the problems with the power flyer." In short, they were afraid that just one flight might be called a fluke which, sorrowfully, seemed to be the general attitude even after their great conquest. Public acceptance of the flying machine was hard to come by.

But the Wrights and their five witnesses that day knew they had not seen an illusion. They and their visitors, after the first flight, carried the machine back to its starting point and prepared it for a second launch.

This time Wilbur was at the controls. The wind had died down slightly when at 11:20 a.m. the machine started moving along the monorail. It lifted off at almost the same 40-foot mark, and behaved in its course much the same as before, although it moved through the air at a faster speed. The landing was smoother than Orville's and the machine had covered a distance of 195 feet, although it had remained in the air only a fraction of a second longer.

About 20 minutes later (taking advantage of the wind conditions) Orville was again at the controls, and the machine started on its third flight. It lifted off the track gracefully but seconds later a gust of wind hiked its right wing up at a rakish angle and lifted the machine up a good 15 feet. To regain lateral balance Orville warped the left wing (aileron) and at the same time pointed the nose down. Control response was excellent, he reported like a test pilot. Perhaps, it was even too good, because the right wing dipped down — the first case of "wing-wagging" although certainly unintentional. Before he could level off completely the right wing tip struck the ground, and the machine slithered to a stop almost in a ground-loop, but undamaged. He was in the air 15 seconds, covering a little more than 200 feet, but setting a new altitude record!

It was exactly noon when Wilbur began the fourth flight. In launch the machine behaved true to form as in the first three flights, but this time it obviously was "going places." Well beyond the 200-foot mark, it started to show decided control characteristics, much more so than the other flights. And it kept on going past the 500-foot mark with little, if any undulation. The seconds ticked by. Then it began to pitch a little, wobbling, and finally darted to the ground, striking rather hard, and breaking the front elevator and supports, but no damage that couldn't be repaired. In its course the machine had covered 852 feet, and it had remained aloft 59 seconds!

Then it happened. A freak accident. They were standing around the machine talking about Wilbur's flight when a strong gust of wind hit the machine and literally cartwheeled it. Wing ribs were broken, the engine damaged, and the guide chains twisted and bent. There was no possibility of any further flights without extensive repair work.

That gust of wind may well have changed history. Because Orville said later that they had intended to make further flights that day, and even considered flying the machine over to Kitty Hawk several miles away. Had they made this flight certainly, there would have been fewer "doubting Thomases," and the Wrights would have been given their earned acclaim as the inventors of the airplane and the first to fly, at a much earlier date.

As it was, however, December 17, 1903 — in the two hours before noon, with a biting cold wind blowing across the windswept sands of Kitty Hawk — became a day for destiny.

For that day the Wrights gave the world its wings. The machine they had devised and proved practicable, and its many descendants during the span of more than half a century has shrunk the earth, revolutionized transportation, opened new horizons for trade and commerce, created new battlefields high above the earth. And most important of all — introduced a whole new concept in man's thinking about time and space and the universe.

Grumman F3F-3 Fighter

Continued from page 22

color on the upper wing.

COLOR SCHEME:

No. 1: Squadron commander — fuselage band: red; entire engine cowl: red

No. 2: No fuselage band — top half engine cowl: red

No. 3: No fuselage band — bottom half engine cowl: red

No. 4: Flight leader — fuselage band: white; entire engine cowl: white

No. 5: No fuselage band — top half engine cowl: white

No. 6: No fuselage band — bottom half engine cowl: white

No. 7: Flight leader — fuselage band: blue; entire engine cowl: blue

No. 8: No fuselage band — top half engine cowl: blue

No. 9: No fuselage band — bottom half engine cowl: blue

No. 10: Flight leader — fuselage band: black; entire engine cowl: black

No. 11: No fuselage band — top half engine cowl: black

No. 12: No fuselage band — bottom half engine cowl: black

No. 13: Flight leader — fuselage band: green; entire engine cowl: green

No. 14: No fuselage band — top half engine cowl: green

No. 15: No fuselage band — bottom half engine cowl: green

No. 16: Flight leader — fuselage band: yellow; entire engine cowl: yellow

No. 17: No fuselage band — top half engine cowl: yellow

No. 18: No fuselage band — bottom half engine cowl: yellow

AIRCRAFT CARRIER COLORS — Tail surfaces as follows:

(1934) —

USS LANGLEY	Red
USS SARATOGA	White
USS ENTERPRISE	Blue
USS YORKTOWN	Black
USS RANGER	Green
USS LEXINGTON	Yellow

(1937) —

USS SARATOGA	White
USS ENTERPRISE	Blue
USS YORKTOWN	Red
USS RANGER	Green
USS LEXINGTON	Yellow
USS WASP	Black

Our model, as shown, was given colors indicating its attachment to the USS Ranger (Fighting Squadron Four). The USS Ranger was one of two carriers that used the F3F-3 aircraft; the USS Yorktown was the other. Color scheme as follows: top of upper wing is chrome yellow; undersurface of upper wing, top and undersurface of lower wings: aluminum color; struts, landing gear, tail wheel unit, wheel centers, fuselage, engine cowling: light navy gray; propeller: polished aluminum color; metal framework on clear plastic canopy: light navy gray; tail surfaces are USS Ranger carrier color: willow green (gray added to green paint); gunsights: black; tires: black with small amount of white added.

Specifications. Upper wingspan: 32', with a 5' chord; lower wingspan: 29' 6", with 4' chord; speed: 264 mph; service ceiling: 33,200'; weight, loaded: 4,615 lbs.

Preliminary procedures. Before starting assembly, I suggest that you read the plan through a couple of times, as this model is a bit more sophisticated than many previous ones. In addition, try all parts to see if they need any sanding and filing for proper fit; this process also will insure that no parts are missing.

The model in photos was made in a static wheels-down position — also, I filled up the

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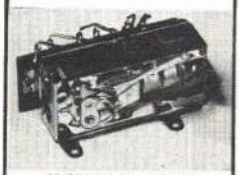

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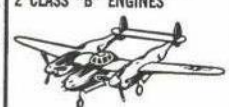

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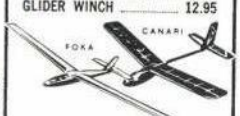

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Add 3 medicine-droppers full of thinner to paint mixture. Use adjusting screw to cut down spray area; move gun faster across object sprayed. If finish doesn't improve, send in 2" x 3" sprayed sample.

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Your paint is too thick. Add 5 medicine-droppers full of thinner to bottle of paint you're using, then give your needle chuck 2 turns to reduce spray.

Frequently, several adjustments are necessary and the amount of thinner varies slightly. Experiment until you find the right balance.

To assist the modeler, Billy Badger offers a "How-to-do-it" handbook on spray painting plastic models. Send for your copy today.

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slot where the gear protrudes from the landing gear through the fuselage sides. In building this particular model it is particularly advantageous to paint small parts before assembly.

The following is a restatement of procedure, primarily stressing the ever-required sanding process. All joints and seams should be filled with auto spot putty or Duratite surfacing putty. After putty is dry, sand to contour so that when model is painted, it will give the effect of being molded in one piece. After each sanding, wash and dry parts before applying next coat, following painting instructions in kit.

Assembly. Model can now be assembled according to the kit instructions. If you will take your time, you will be well rewarded with a beautiful model.

You may make the model in the colors of a different carrier by using colored decal sheets. Sig Model Supply Co. carries a good stock of these sheets. Use the decals in the kit as a pattern guide for any decals and markings made from these sheets.

I found that I could do a better rigging job with a lighter weight nylon thread than that supplied in the kit. A light gray color was used. When the thread was stretched and secured to the plastic "button," I used model airplane dope applied with a small, pointed brush, working the dope around the anchoring device.

As an addition to your Miniature Air Museum, the Grumman F3F-3 cannot miss being a stand out as it probably will be the most colorful model in your collection.

MAIL BAG

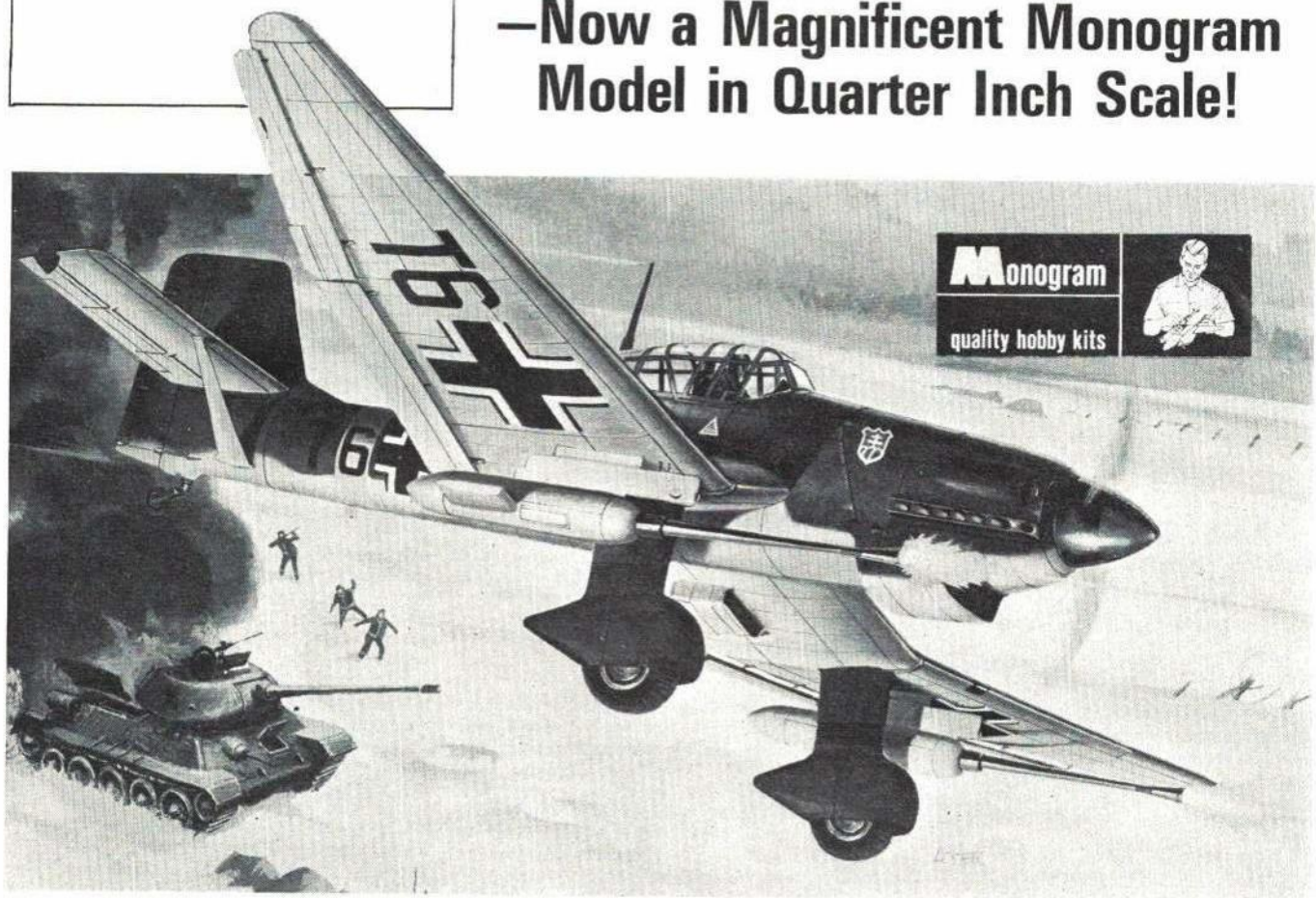
Official Products, 9 Helen Ave., West Orange, N. J. released after seven years of research, 62 authentic Aircraft Camouflage Hobby Paints for German, Japanese, USAF and Navy model planes. This unique paint is guaranteed to cover in one coat without brush streaks and dries in a few minutes to give a completely flat, service aircraft finish. Selling for 50c, the ½ oz. bottles are labeled with authentic, easy-to-understand instructions. Thinner is 25c per bottle.

Authenticals, 2491 Twenty-first Ave., San Francisco, Calif. 94116. Two packages of decals (Sheets No. 4 and 5). Sheet No. 4 contains five sets of decals for P-47's in 1/72 scale. Four sets of markings of leading aces of the 56th Fighter Groups, US 8th Air Force, are included; the fifth set is for the Pacific Theater of War from the 342nd Fighter Squadron, 348th Fighter Group, US 5th Air Force. These decals will greatly enhance any model, giving it definite authenticity. They are accurate, neatly done — as good as any on the market currently. Sheet No. 5 contains 21 different "kill" markings to bring your ace's models up to the proper score.

Ju 87G-1

Junkers STUKA

World War II German "Tank Buster" —Now a Magnificent Monogram Model in Quarter Inch Scale!



The first quarter inch (1/48) scale model of the famous "tank buster" Stuka, which dominated Germany's eastern front in the first year of World War II. Various versions saw service over Spain, Russia, Poland, Africa, France and other western front countries from 1938 to the end of the war.

This model is a faithful copy of the 87G-1 version flown by Ulrich Rudel, credited with destroying 500 Russian tanks.

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1/72 scale—70 cents to $1.50. Messerschmitt Bf 110—Curtiss P-36A—Mustang P-51B—Bearcat F8F—F-105 Thunderchief—Warhawk P-40N—Skyraider A-1E—Ford Tri-Motor—A-5A Vigilante—Albatross HU-16B—F7F-3 Tigercat.

Made Exclusively by Monogram Models, Inc., Morton Grove, Illinois

A.M. Reviews

Continued from page 9

New classifications were added: Knight's Cross with Oak Leaves; with Oak Leaves and Swords; with Oak Leaves, Swords, and Diamonds; with Golden Oak Leaves, Swords, and Diamonds (for those who had been awarded all other classes of the Knight's Cross); and ultimately, the Grand Cross of the Iron Cross.

Ernst Obermaier has compiled here a list of 568 Luftwaffe (German Air Force) Knight's Cross holders, with photographs and records of accomplishments of each. These include the pilots of fighters, night fighters, destroyers and fighter bombers. Holders of the Knight's Cross are presented in alphabetical order, while the holders of the higher classifications of the Knight's Cross — with the Oak Leaves, Swords and Diamond combinations — are presented in chronological order of bestowal.

Printed in German and an accompanying English translation, this book makes a valuable addition to the aviation reference library.

Aeronautica, New and Antiquarian Aviation Publications, a catalogue by John W. Caler, 36 pgs. plus many inserts. Free with all orders or for 25c. John W. Caler, 7506 Clybourn, Sun Valley, Calif. 91352.

JOHN W. Caler gives a most complete listing of used aviation books and periodicals. The list includes back numbers of all aviation magazines. Catalogue also contains an alphabetical listing by author's name of hundreds of old, and current books. In addition to aviation publications, there are offered a wide variety of model building plans, scale drawings and supplies and a huge assortment of decals for modelers.

Albin Receiver

Continued from page 35

fashion. Albin has utilized the German Bentert "large" actuator (this one and the much smaller one by the same maker are stocked by Polks) which has a 40-ohm coil. He prefers to make preliminary tests with a #49 pilot lamp connected to the set in place of the actuator; current drain is about the same. (The smaller Bentert unit has an 80-ohm coil, so will draw much less current; with it you must take more care to see that linkages and rudder hinges are absolutely free in operation — which is the reason Bill prefers the bigger unit). About all there is to do in testing is to turn on a 27 MHz transmitter that has modulation around 800 cycles (this value is optimum, but the set will work on modulation from perhaps 500-1200 Hz) and tune L1 to maximum brilliance. If you wish to test the set with a meter, it's preferable to put it only in the lead from the collector of Q5 to battery minus; it is possible for a meter in the battery lead from the entire receiver to produce erratic action — as is the case with quite a few super-regens.

If you get good operation near the transmitter, try a distance check. If you find that the bulb (or meter, if you use one) lights up steadily when there is no incoming signal, it is a sure sign that C10 should be increased in capacity. Insert the extra .05-mf capacitor that is part of the Ace kit, and try again. Optimum value for C10 is to have the bulb or meter show erratic current indication, with no transmitter turned on, but to show practically zero current with the transmitter on, and no modulation. With modulation, you will get full output, of course. The bulb can't show you much about low current in the actuator circuit, of course, and we personally prefer a meter in the Q5 collector lead, for this reason. With a 3V battery, the meter should indicate close to 60 ma with the bulb or large Bentert actuator, and about 32 ma for the small Bentert. With a CW signal coming in these receivers show only about 1-2 ma total current, but with tone, you will have some 10-12 ma battery drain *in addition* to whatever drain you have through Q5.

It is just possible that your receiver might be too insensitive, in which case C10 should be lowered in value. However, none of the test models have shown this fault. We did have one receiver that showed just about zero actuator current without an incoming CW signal, but still had quite reasonable sensitivity. So don't jump to conclusions until you have made distance tests. If the no-signal current shows erratic jumps (and it might even average up to 20 ma or so) you know the set is "hot" enough, and ready to go.

While Bill Albin intended the receiver for pulse propo operation, it could certainly be used with an escapement. It would be wise to choose escapements with enough coil resistance to keep the current through Q5 to 300 ma or less.

The Bentert actuators for which this receiver was intended have a single coil, and the rotor is magnetically biased to one side; when current is applied to the actuator coil, the rotor pulls to the other side (provided coil polarity is correct — if it isn't, the rotor would try to turn ever further to the biased side). Other single-ended actuators with a reasonably high coil resistance can also be utilized, of course. Or you can spring-load the rotor of such units as the Baby Adams to one side, when full current will pull it the other way. On this actuator, and any other that has a center-tapped winding, use the entire winding and disregard the center tap. If there are two separate windings (as on Septalette actuators), connect the two in series — again, they must be polarized correctly.

Minimum installation weight with the Albin receiver, the small Bentert actuator, and the smallest practical cells, we have been able to find (the Eveready S76 silver oxide cells are the lightest for their operating capabilities) is about .65 oz. If your model can carry a bit more weight, you could go to size N flashlight cells, much smaller button nickel-cads, etc. The small Bentert actuator weighs .25 oz., the large one twice this — but the latter has considerably more than twice the power (it takes twice the battery current, too). When figuring battery drain, don't forget that with a "single-ended" pulse propo system such as this receiver provides, the actuator current is only high for half the time; the other half the receiver drain is only a couple of ma. Also, don't forget this receiver draws an added 10 ma or so on tone, that does not show up in the actuator circuit.

The .65 oz. noted above brings possibilities of converting small rubber scale jobs to R/C, of applying R/C to rocket "boost-gliders," of controlling tiny cars and boats. The possibilities for indoor R/C models are very good. We would like to hear what readers fly or operate with this micro-miniature equipment; drop us a line and send a few photos!

Mooney/Mark 21

Continued from page 25

model to fly slightly nose high, thus producing a good rate of descent.

The tail assembly is removable for assistance in transportation (mainly so it will go into a smaller shipping box). It can be glued on, thus saving a bit of work. How-

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Kit GDA-47-4, one servo only, ship. wt. 1 lb. **$21.50**

GD-47 SPECIFICATIONS — TRANSMITTER — 5 Channel — Input power: 0.8 watt maximum. **Output power:** 0.4 watt minimum. **Weight:** 2¾ lbs. **Dimensions:** 6⅝" H. x 6¾" W. x 2⅝" D. **SERVO-Thrust:** 3.5 lbs. **Travel:** ⅝". **Dimensions:** 1 7/16" H. x 1 3/16" W. x 2 3/16" L. **Weight:** 2.5 oz. **RECEIVER — 5 Channel — Dimensions:** 1⅜" W. x 2 3/16" W. x 2⅞" L. **Weight:** 5 oz.

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ever, if you attend many contests involving much traveling, you will find that the removable stab is worth its weight in gold.

The Mooney flies like any other contest-type, low-wing design. It is responsive, but it will let you have time to figure out how to correct for a goof you made during a maneuver. The takeoffs and landings are almost automatic. You can get nines and tens on the takeoffs and landings like falling off a log.

So you like the design, but want to change it a little. I have heard this comment many times with my other designs, and other people's ships. Here are a few suggestions to try. Make it a Piper Commanche by changing the rudder and elevator shape, along with a higher slanted windshield (the full-scale Mooney and Commanche are quite close in design), side mount the engine with the possibility of also cowling in a muffler, lengthen the tail moment to cut down the elevator sensitivity, thicken the wing to 18% or so, maybe also thicken the elevator to 10-12%. Why not a full-flying tail like the Commanche? Add flaps? (On the Mooney use 2½" wide flaps to the ailerons.) Who knows what other changes you can make? Really, the ship is a pretty good bird just the way it is, but change it if you must.

Building is straightforward. I usually build the wing first, so that it can be fitted to the fuselage when the time comes. I used 1/16" sheet for the wing sheeting, but if you have some good 3/32", then I would recommend using it instead of the 1/16". Build the wing on a piece of 1-in. straight plywood. First step is to glue the ribs to the bottom trailing-edge sheeting, and let dry. Now locate the ribs on the bottom spar, which is attached to the building board, letting the trailing edge sheeting suspend in the air. Make a ¼" balsa sheet shim so that the trailing-edge sheeting will rest on the shim with the centerline of the ribs parallel to the building board. With the bottom spar and trailing-edge sheeting now supported, continue with the rest of the construction. Flip the panel over when the top sheeting is completed, and attach the wing back onto the building board with the trailing-edge shim in place. Continue construction. The ailerons are cut out after the wing is complete.

The rest of the construction is basic. The bending of the top fuselage sheeting can be aided by soaking the balsa in ammonia at the sharp bend area.

I use a non-shrinking butyrate dope. Glidden Paint and Sig have such dope. This dope eliminates the sags in the sheeting completely. The open areas in the wing are almost flat; a tightening dope isn't needed. Four to five thin sprayed coats of color dope will provide ample shrinkage.

The nose gear shown on the plans is of my own design. Any belly-type mounted gear can be used (deBolt, Tatone, etc.). With some minor structural changes the firewall-type gear can be used.

The mounting plate used on the original Mooney is 3/16" aluminum. This works great. No mounting nuts are required because the mounting screws are threaded into the tapped plate. If the aluminum mount isn't used you can use ¼" plywood, made out of two pieces of 5-ply, ⅛" plywood, or 3/16-¼" micarta or fiberglass.

The celluloid windshield is covered with the silk. In my opinion, leaving the windshield clear detracts from the appearance of the ship unless the rest of the windows are clear. To me, this would be too much work. (We are building a stunt, not a scale ship.)

I think you will be pleased with the design. Having a model that flies well, yet looks like something real will give you more pleasure and satisfaction.

JERRY NELSON JOINS STAFF OF AMERICAN Aircraft MODELER

We are pleased to announce the addition of Jerry Nelson to our staff as contributing editor, effective with this issue. It will be Jerry's mission to report on West Coast activities, and to assist the publisher and editor in the acquisition of local material for publication.

Famous for his many popular RC designs in magazines all over the world, and for his chairmanship of the group that organized the Goodyear rules, he has a long list of other achievements on his record. Member of the 1966-67 AMA RC Contest Board — chairman this year — he was on the 1963 International Team representing the U. S. (team manager in 1967). Active in RC competition since 1956, he attended meets in Japan, Belgium, Mexico and Germany. He is U. S. correspondent to German **Flug** magazine.

With Orbit during 1966-67, he is now producing his own ready-to-fly 12-ft. RC glider, with other designs and accessories to follow. Having designed and flown more than 50 RC models, and worked in his dad's R&D shop as an engineer, he was well qualified to organize his own company called Nelson Model Products, Inc.

Now 30 years old, Jerry holds AMA number 2025, NMPRA Racing number 12A, Radio Call WA6YTA. He also is a licensed airplane and glider pilot — 300 hours, mostly gliders. His interests are not just radio — he is an accomplished free flighter and Nordic fan as well.

Countdown

Continued from page 41

length-to-base-diameter ratio between 2 and 3. Morlin-I has a hollowed-balsa, ellipsoidal nose with an 1/d ratio of 3. This gives a pressure drag coefficient so low that it's difficult to measure it. If the balsa surface is filled and a very smooth, high-gloss finish applied, the boundary layer will remain laminar over the nose at nearly all speeds, and the friction drag coefficient will be very low.

Length-to-diameter Ratio: Friction drag depends upon surface roughness and upon total wetted area. If the boundary layer is kept laminar by careful construction and finish, the lowest total drag on the body of a model rocket is achieved with length-to-diameter ratios between 10 and 16, according to Professor Jerry Gregorek of Ohio State. The 1/d ratio of the Morlin-I is 14.45. Actually, the lowest possible 1/d ratio is best if the boundary layer is turbulent. And it probably is, starting at some point back from the tip of the nose and depending upon the model's speed. However, whether the boundary layer is laminar or not, some compromise must be made with stability. Here is where the high 1/d ratios pay off. A model with a high 1/d ratio requires less fin area for adequate static stability and can have a much higher dynamic stability. (Note: This whole area of the relationship between 1/d ratio, drag, and dynamic stability is one that is receiving considerable attention. It's mathematically messy, but some NAR Leader and Senior Members with access to computers are making progress.)

Fin Shape: Which is a better fin planform? Delta, rectangular, tapered-swept, clipped delta . . . or does it really make any difference? I believe that it does.

When a model rocket flies at zero angle of attack, its fins with symmetrical airfoils produce no lift force. Therefore, the only fin associated drag is the interference generated at the junction of the fin root and the cylindrical body and the friction caused by the boundary layer of the airflow over the fin surfaces. Theoretically, the interference drag caused by the fin-body joint can be reduced by using a triform fin configuration instead of cruciform, and by fillets at the fin-body joint; this drag can never be eliminated, but it can be reduced. Because of the small fin chord, airflow over their surfaces is probably laminar at all model rocket flight speeds. A good finish is important to minimize friction drag.

However, no model rocket flies continually at zero angle of attack. Disturbances tend to swing it away from zero to some angle of attack. When this happens, a fin assumes an angle of attack to the airflow also and therefore begins to generate lift. This swings the model back to zero angle of attack so that it flies straight. So, a fin **must** be treated as a small wing with a symmetrical airfoil, and we must begin to take into consideration such wing factors as aspect ratio, slope of the lifting coefficient as a function of angle of attack, induced drag (drag due to lift), stall, tip vortices, etc.

This introduces so many variables that a model rocket designer must resort to "trade-offs" or compromises. The trade-offs a designer makes become like a signature; you can nearly always spot his designs. As an example, check a couple of manufacturer's catalogs. One firm's models generally use a tapered-swept fin planform. Another is partial to clipped-deltas with no trailing edge sweep. Yet another will favor trapezoidal fins. Often, the fin planform is selected on the basis of "aesthetics" (a model rocket must look like a rocket be-

fore it sells well as a kit). There is nothing wrong with the aesthetic approach; often it results in very high performance.

There is much to be said in favor of the airplane designer's truism: "If it looks right, it will fly right."

However, we've got a miniature wing hanging out there called a fin. Scientific principles that apply to wing design hold true for model rocket fins. Different wing planforms have different purposes. The same holds true for model rocket fins. A fin planform should be selected as a result of a trade-off analysis based on the end-use of the model rocket.

Let me add here that I have no criticism, implied or intended, relating to any designer or manufacturer or the models designed and sold. I am trying to let you in on some of **my** design philosophy, that's all.

I would use a tapered-swept planform on a model only if it were absolutely necessary to move the CP further aft, and if there were no other way to accomplish a CP shift than by sweepback. A sweptback planform — sweptback leading and trailing edges — is a transonic-supersonic planform. It has serious drawbacks when used on a subsonic model rocket. Induced drag due to sweepback is higher than with a non-swept planform. In addition, the tips of a sweptback planform stall before the root. If your model gets into some high angle of attack swings, the farthest aft portion of the fin — that you need the most — becomes ineffective first. Tips stall, the drag goes up and the lift decreases.

If you have a short, squatty altitude model likely to undergo wide excursions of angle of attack, or if you want your model to remain stable over wide angles of attack, or if you have a heavy model likely to get into high angle of attack regions because of inertia — the delta planform would be suggested. Lift curve slope on a delta planform is not very great, but it will perform out to 45° angle of attack or more before it stalls. There is much to recommend a delta planform for model rockets. It is an excellent compromise with good lifting qualities and good drag qualities as well, in addition to its ability to operate over a wide range of angle of attack without stalling, its structural stiffness, its abundant gluing area at the fin root and its freedom from warping or fluttering.

But if you want the lowest possible induced drag, the clipped delta with carefully-formed tips is the answer. I have carried out a great deal of research into several aerodynamics texts and looked at a lot of data from various wind tunnel studies. The result is the clipped-delta planform used on the Morlin-I. Design parameters of this clipped-delta are dependent upon the diameter of body tube used, and these are spelled out in Fig. 1. The 20° sweep of the quarter-chord line does not increase the induced drag appreciably because this varies as a cosine function or quite near to it. The taper ratio (ratio between the tip chord and root chord) is 0.5, which closely approximates the proper, spanwise, aerodynamic loading characteristics of the classical, low-drag elliptical planform (Spitfire style). If a well-streamlined symmetrical airfoil is used on the fin, pressure drag will be nearly zero, even for a fin thickness 10% of the chord. The tip shape as shown is very important. This shape is the major controlling factor over size and strength of the tip vortex, and this contributes mightily to induced drag. This fin planform should stall at about 10° to 20° angle of attack, but it has mighty powerful lift which acts as restoring force.

Having triggered what I hope will be some controversy on fin design, I invite you to comment.

Surface Finish: Surface finish is the most overlooked, neglected and misunderstood area of model rocketry. The science of aerodynamics plainly states that our models fly smack in the middle of the "transition range" of Reynolds Numbers. At low Reynolds Numbers (at low speeds or with small dimensioned models), the boundary layer is laminar. At higher Reynolds Numbers, it is usually turbulent. The friction drag coefficient for turbulent boundary layer cases is often twice or more that of the laminar boundary layer. It behooves a model rocket builder, wanting to reduce drag, to try to maintain a laminar boundary layer over his model. A laminar boundary layer can be "tripped" into a turbulent boundary layer by a projection into the boundary layer as thin as 0.0003". A sloppy nose-body joint can trip it easily, and the friction drag on your model is thereby doubled at least. A rough paint job can trip it. Undoubtedly, the launch lug trips the boundary layer on one side. This seems to indicate that a model rocket should have a glassy finish with no protuberances.

Eliminate the launch lug by using a tower launch. Use no decorative tape rings or even decals. Eliminate the nose-body joint by using some manner of rearward-ejecting recovery device (this is difficult and may add enough weight to offset any drag reduction produced by eliminating the joint).

Of course, this means that the first time you ding the model in any way — goodbye reduced drag! But you can gain significant performance improvement by filling, sanding, painting, compounding, rubbing, waxing, and polishing your altitude model.

In the future, we'll explore the fascinating "whys" of some of these points.

Dual-Carb Power

Continued from page 26

power comes at high speed, and is progressively less as speed is reduced. As rpm changes, other problems crop up.

By varying the air intake and/or the fuel intake, methods have been developed which effectively compensate for most problems. The simple barrel-type valve has proved quite successful in reducing the amount of mixture available to the engine, thus controlling the rpm. Another problem is the need to reduce the size of the venturi throat. It seems that, no matter how much you work on the air and fuel controls, they just will not compensate for the effect of a large venturi at low rpm. What is really needed is a large-size venturi when maximum power is desired, and the smallest possible opening when low-speed is called for. Would you believe a variable-size venturi?

The current trend is to large displacement capable of considerable power; and then detune the engine for a reliable idle. The detuning is done with a carburetor which has a venturi throat much smaller than would be desirable if maximum power potential is required. The result is an engine with the power required and reliable idle. The detrimental factor is that we are using a much larger and heavier engine that would otherwise be required to produce comparable power — provided, of course, that the smaller engine would idle satisfactorily. This might remind you of some older cars, the Duesenberg for example, which had some 300 odd hp, just as many autos have today. But the Duesenberg engine weighed as much, and was darn near as big as, a whole car of similar power today! For our models it would seem that an engine about two-thirds the present size and weight would offer similar power to what we are using, provided it was not detuned for an idle. Dual carbs could be one answer which would give the power needed, plus an idle with the smaller engine.

The automobile industry has had idling problems. They also tried the approach which we have been using, and it seemed to work for them about as poorly as it has for us. However, as the horsepower race progressed, they found it necessary to switch to the high-performance type engines in order to keep up with the pace. These engines had tough idling problems which took high-powered engineering to solve. What seems to have been their final, and relatively simple, answer is the four-barrel carburetor. This unit has four barrels, or venturis, which are used in pairs. One pair operates when the engine is in the low-speed range and both pair are used when maximum power is desired. Thus, they effectively have a variable size venturi, just as we do.

My Dual-Carb engine is an adaption of the four-barrel carburetor idea. Two carburetors have been used on model engines before, but to my knowledge, they have never been used to control the speed of the engine. With the Dual-Carb they are used to provide an effective variable venturi, providing maximum usable venturi size for power, and at the same time, the smallest usable venturi for idle. The operation is simple.

The front carburetor is the low-speed carburetor; it provides the fuel mixture up to about one-half speed. At about half speed the rear carburetor is put into operation, so that, above half-speed, both carburetors are in use. The forward carburetor venturi size is suitable for the best idle performance; its throat size is smaller than normal. The rear carburetor has a venturi

of such size that, when its area is added to that of the front carburetor, the total is that required for maximum power.

At low speed the small venturi compensates for the lower vacuum or fuel draw by increasing the velocity of the mixture in the carburetor. The mixture moves at a speed closer to normal high speed; this equalizes carburetor efficiency. With an efficient carb supplying the correct mixture to the engine for the speed desired, it is much easier to improve low speed performance.

The more fuel mixture fed to the cylinder, the greater the power. Since the venturi is the mixture intake, it must be as large as the engine can use when peak power is desired. With Dual-Carbs the maximum possible venturi area is supplied only when the engine requires it. In this way the engine is tuned for maximum power, yet is capable of idling reliably. With such a carburetion system we can obtain the power potential in any engine.

No idea is good until it's proved. From my three Dual-Carb engines, I have determined that the power increase is at least 20% more than the equivalent R/C engine.

It is important to note that, when an engine venturi is restricted, it is naturally smaller than what the engine can use. It acts as a governor on maximum speed. This is a handicap when the load comes off the engine because of forward speed. With maximum venturi size the engine picks up power with airspeed. A restricted venturi prevents such a great increase of power in the air. A plus factor is that this picked-up power comes at the top of the power curve, where we can use it to best advantage!

A number of engines are offered both in front and rear-rotor versions. Parts usually are interchangeable, so it is rather easy to put together an engine with two carburetors. Only the lack of time has prevented my trying more than three Dual-Carb engines. I have used the K&B 40 and the S. T. 46. Very little work was required to alter either of them.

A front-rotor version was purchased. The complete back crankcase plate assembly for the rear-rotor version was then obtained, including the carburetor normally used with the engine. Also obtained was a carburetor as used by the manufacturer on a much smaller engine. This carburetor might normally be used with an engine about half the size of the one being worked. The normal rear crankcase cover of the front-rotor engine is removed. Substituted is the new rear rotor cover assembly, including the carb. The normal carburetor is removed from the front rotor and the new smaller one is fitted. If the engine has an exhaust throttle, retain it.

Now we have an engine with carburetors on front and back, plus an exhaust throttle. The problem is to connect all three units together, to a pushrod from the servo. Step one is simple, and probably has been done by the manufacturer. The exhaust throttle is connected by linkage to one of the carburetors; it makes little difference which. However, be sure that the exhaust throttle delays opening a bit when the carburetor is operated; this is normal with commercial setups. Actually, the delay may be increased if the exhaust throttle is coupled to the rear carburetor, because this unit will operate much later than the forward one. The front carburetor is the basic one, so connect the pushrod to it.

Means must be provided so that, as the forward carburetor is operated, the rear one will remain closed until the engine has reached about one-half speed. The rear carburetor must also close as the engine is slowed down from full-speed to approximately half-speed. By using leverage and a

simple over-ride-type pushrod to connect the two carburetors, this is accomplished rather easily. To get the rear carburetor to close twice as fast as the front one, the operating lever on the forward carburetor is made twice as long as the one on the rear. I used a "stock" lever on the forward unit and made up one with half the leverage length for the rear carb.

The pushrod between the two carbs uses a simple collapsible coil spring. The spring is assembled, similar to the enclosed sketch, with tubing and iron wire. As the forward carb is operated toward the low-speed position from high speed, the tubing portion of the pushrod is solidly attached to the rear carburetor. The wire portion of the rod is attached to the forward carburetor at one end, and to one end of the coil spring at the other. Thus, if you pull on the wire while holding the tubing still, it will appear solid as long as only moderate tension is applied. When a bit more tension is added, the pushrod becomes longer due to the collapsing of the spring. Due to the leverage differential between the two carburetors, the forward carb will still be partially open as the rear one closes completely.

As the servo continues to move, it puts more tension on the connecting pushrod, which further collapses the spring, allowing the connecting rod to become longer and the forward carburetor to close as desired. In going from low to high speed the opposite action occurs. In setting this up, it helps to remember that the engine basically runs on the forward carburetor, and that the rear unit is only used as a "boost" for maximum power. Operation is different from a single-carburetor engine. We want the engine mostly to use the front carb and then, when maximum power is called for, use the rear or auxiliary unit. No adjustments are required on the rear carburetor, other than the needle valve, which is set to provide the mixture needed for maximum power.

To put the engine into operation, the needle valve on the rear carburetor is closed completely. The air intake on the rear carb is blocked off; a finger can be held over it just as when choking an engine. The engine then is started, using the front carburetor as if it were the only one.

All adjustments are made to the front carburetor to perfect operation over the entire speed range which this carb will provide. In other words, with the front carb wide open, its needle valve is adjusted so that the engine is peaked to maximum available rpm. The carburetor is then closed and any adjustments are made, so that the engine has a reliable idle at the lowest possible rpm. Only when the engine is operating perfectly on the front carburetor, with the rear one completely closed off, do you proceed. Open up the needle valve on the rear carburetor several turns while the engine is idling. Now, with your finger removed from the rear carb, open up both carburetors. If the engine sounds lean at full throttle, the mixture is richened with the rear needle valve only.

If it seems rich, it also is leaned with the rear needle. No further adjustments should be necessary. You will note several things immediately. Most prominent will be the great difference in rpm, depending on whether one or two carbs are in use. Best description I have heard, is that it acts like an afterburner on a jet! This is a large part of the 20% increase in power. You also will probably note that the engine idles slower than it did with its original single carb. This idle should be more reliable, and all adjustments much more docile. In fact, one of my K&B's seemed happy without airbleed or carburetor adjustments!

A different fuel tank arrangement is required with two carbs; both must be served with fuel. There are two ways which work equally well. Use two separate fuel lines from the tank to the carbs, install a "Tee" in the single fuel line at the rear carburetor, so that both may draw fuel through the same line.

I do believe Dual-Carbs have proved the value of a variable venturi. They have proved it possible to use the maximum power potential of an engine in R/C and still have a reliable idle, better than with any other known system.

This is not the only way to accomplish the job. It does seem the most simple and practical way. If you are looking for something better in a powerplant may I urge you to give Dual-Carbs a try.

Radio Control World

Continued from page 32

spot frequencies. We have been unable to locate any compact low-cost receivers that will cover one or more of the R/C bands. Does anyone know of such a receiver?

R/C helicopter info? Since he has been flying helicopters in the Army for several years, WO Robert N. Paris (W3154444, Aviation, 3rd A. CR. Aviation Co., APO NY 09034) has the urge to build a model of one of the big ones. In fact, he has already tried, but says all he has developed so far is "several sets of bent rotors." He wonders if there is any club that specializes in model helicopters — or any manufacturer of same. Sorry, we can't offer names of either, but are running this info in hopes some reader with the desired data will contact Bob. He has built mostly scale WW I models in the past and flown them with single-channel equipment, but has now graduated to multi with a Bonner 4RS.

Throttle linkage termination: Neat system devised by Tim Brown (8715 Glenloch, Houston, Tex. 77017) is based on a couple of Midwest nylon pushrod retainers. In one, Tim cut a groove around circumference; this one is held on the throttle arm and is drilled out to turn smoothly on a 2-56 bolt. Another retainer is sawed in half to reduce thickness, and is threaded onto the outer end of bolt as a retainer for the grooved piece. Stranded cable is looped around the groove, held tightly in place by a short length of brass tube, which is mashed flat. Hobby shop brass tubing is rather hard, may crack if you try to squash it; just heat it red hot and let cool to soften it — when it will be much better for this application. Tim runs the stranded throttle wire through 1/16 ID nylon tubing back to the throttle servo.

Transmitter on 27 Mhz: This idea is rather "far out" but appears perfectly workable. Steve McGuigan (1107 Cottage St., Vienna, Va. 22180) says he has used the transmitter with a glider, and had plenty of range, but the walkie-talkie should probably be one with more input power than the under-100 mw jobs. Idea is simply to tape or otherwise hold the send-receive button of an unused 27 Mhz CB walkie-talkie in the transmit position, then mount it in a small box, using a bicycle horn to modulate the output. The horn button that comes with the bike accessory is utilized as the keying control. Case should be filled with sound-absorbing material to prevent transmitter modulation by outside noises.

If an under-100 mw walkie-talkie is employed, it can operate on any frequency within the range of 26.97-27.27 Mhz — but beware of causing interference to other modelers! Such a transmitter should be fine for short range — boats, cars etc. If the walkie-talkie is of over 100 mw input, you

will have to change crystals to get it on an R/C spot. If you insert an R/C crystal for the frequency nearest the CB frequency upon which the unit formerly transmitted, no transmitter retuning should be needed (it's illegal anyway!) and output should not be reduced.

What happens to 465? With low-cost receiver transistors now available that will work fine well above 500 mc, some of us have wondered if perhaps this long-neglected RC spot might not be put back to use, with an all-transistor receiver driven by one of the only two transmitters ever approved by the FCC for operation on 465 mc, the units by Citizen-Ship and Babcock. The former was a CW outfit (no tone modulation) and adding tone to it would doubtless void the FCC type-acceptance. This leaves the Babcock, which could transmit two tones. But before we got too excited or active over the prospects, we checked on the matter through the AMA. The answer is simply that as of Nov. 1, 1971, all RC operation must cease on this spot, as it will be given over to business paging operations. Pressure on the FCC for new frequencies is terrific, and there aren't many left. Any that are not in use, and that has certainly been true of the CB Class B 465 mc RC spot, must be taken for other uses. At this writing, the proposal has not been adopted, but it probably will be. Another good RC idea down the drain. . . . !

Audio tachometer: This adaption from the seventh G. E. Transistor Manual of a metronome is suggested by Warren Plohr (5395 Sunset Oval, N. Olmsted, Ohio 44070) for use as an audio tachometer for checking model engine speeds. He suggests that R1 and C1 be picked to give about 60 Hz tone with the 100K pot at midscale. For checking engine idle speeds, the fundamental output of the circuit is utilized,

since 60 Hz equals 3,600 rpm, 30 Hz equals 1,800 rpm, etc. Then for higher speeds you utilize harmonics; 60 Hz would be equivalent to the second harmonic to 7,200 rpm, 100 Hz would indicate 12,000 rpm and so on. If desired, you could doubtless add a switch to cut in different values of R1, C1 or both, so that you could calibrate and check the entire engine speed range with fundamental tone output from the speaker.

Nose wheel linkage: Convenient linkage devised by James Watson Jr. (124 St. Joseph St., Mt. Carmel, Ill. 62863) allows easy adjustment of amount of nosewheel movement, while not altering rudder throw. Nosewheel pushrod is attached to the U-shaped music wire by means of a Rocket City aileron link; shift of latter in direction of arrows will alter ground steering radius. The U-wire has the advantage of acting as a shock-absorber in case of bad landings — prevents transmitting the jolt to the servo itself.

COMPETITION FLYING

Fun-fly events: Many clubs like to get away from straight stunt competition, especially for inter-club contests, and here are a few well-tried events to test. One of the simplest is the doughnut drop. Make up a holder of thin ply about 2½" square, with a 3" length of ¼" dia. dowel cemented vertically in the center. Supply plenty of rubber bands for the contestants to attach this "launcher" any place they wish on their plane. The idea is simply to drop the doughnut as close as possible to a mark on the field. How the flyer does the dropping is his business — and some weird techniques will probably be seen. An old model plane wheel tire of about 3" diameter can be substituted for the doughnuts — which don't last too long in this rugged service!

Setting up a speed measuring course is simple. You measure 528' on your field, with open areas beyond each end of the speed course. Put in markers and station a club member at each. One has a flag, the other a stopwatch. As the plane — which should fly perhaps 50' high through the course and 50-75' in front of the checkers — passes the flagman, he drops the flag when the plane is exactly opposite him. The other checker starts the watch, then stops it when the plane passes him. Two runs — up and down wind — are required, of course, so on the way back, the procedure is simply reversed; the watch holder starts his timer as the plane passes, stops it when he sees the flag drop at the other end of the course.

The two times are then averaged. It helps to set the course out so that the planes will fly exactly up and downwind. If the wind varies, the speeds will still be fairly comparable, though, as long as each plane makes its consecutive passes each way along the course under about the same wind conditions. The less wind, the better, of course.

The Hidden Spot contest: Before the meet, the scorers prepare a "grid" of the field, by marking cross and lengthwise lines on a rough map, to break the field landing area up into squares perhaps 10' on a side. As each plane lands, quick measurements are made from the same distance at one end and one side of the field, and the spot recorded on the master drawing. The prize spot has been selected beforehand. It needn't be right at the center of the area — where the hotshots will try to touch down; maybe way off at one corner or even in the "rough." This event can be combined with any other, or the landing spots simply checked after each sport flight.

The number of loops, rolls or other simple stunts that can be timed in a minute (or half a minute) is an easy one to set up and judge. The pilot signifies when he is ready to start; the judge counts the stunts and operates the watch.

Spin contest: Best way to do this is to give the pilot a specified time to take off and climb as high as he can; say, a minute or two minutes, depending upon what type of planes are being flown (and on the judges eyesight!). When the timed climb interval is complete, the judge calls out this fact, and the pilot starts a spin as soon as possible.

LeMans start: This is a wild one. Pilots take off props, and line up 50 or 100' from their planes, which are placed in an even line. At the signal, the flyers head for their planes, with the prop held in one hand horizontally in front of them, and the nut on the blade away from them (no chewing gum allowed!). When they reach their planes, they must mount the prop, then start the engine. First engine that starts and *keeps running* wins.

The timed glide: This is a good one. Here measured fuel is put in the tank, and length of engine run is timed as the pilot climbs as high as he can on the limited fuel, then the glide time is started when the engine stops. Glide time is divided by engine run, to get final score. Tank must be empty before measured quantity of fuel is put in, of course; amount of fuel depends upon conditions, and on size of planes in the event. If there are many small planes, it might be best to set up several classes, with different amounts of fuel allotted to each class, on the basis of engine size. A few trial runs before the meet will give a sound basis for engine classes and fuel quantities.

If there are many youngsters at the field during the meet, pick out a safe spot, assign a few timers and hold a glider duration contest with 10c gliders. Or maybe you can even persuade the wives to enter a glider contest!

These are only a few of the possibilities; often several events may be combined in a single flight. Events that take a minimum of preparation and equipment are best; they are still better if they take minimum man power and are simple and non-controversial to judge.

Alamo meet: The Alamo RCS (San Antonio, Tex.) held its Regional Meet on Oct. 14-15. According to James Albers Jr. (230 General Kreuger, San Antonio) who sent a very complete report, the 15th was rained out, but flying was hot and heavy on the 14th. Apparently just about every club member helped run the show, led by George Aldrich as Contest Director and Jerry Kleinburg as Contest Coordinator. Top Winners: Class I, Buddy Bramer; Class II, Bill Feloschan; Class III Novice, Mal Trosclair; Class III Expert, Cal Scully; Scale, Pat Hartick. Open Pylon and Goodyear, to be flown on Sunday, were cancelled by the rain. Many newspapers in the area, as well as TV and radio reporters were in attendance, and the club is grateful to Southwest Research Institute for the use of Hurt Field for this meet.

RC autos: In colder climates, many RCers turn to model cars in the winter, hold regular indoor races etc. But a new group on the West Coast intends to race all year around. The Radio Operated Auto Racing Assoc. (625 S. Euclid, Anaheim, Calif. 92801) was formed to promote the racing of model cars with glow engines. While any size of car is welcome, they feel ⅛th scale (1½" to 1') is best, with 1/12th a second choice. Competition will be featured, of course, with the hope of running a ROAR Nationals each year. The group acts as a clearing house for members to disseminate info on where to get components and how to use them. ROAR is preparing an 8 mm film on

racing. Many of their cars have clutches, some even gear boxes worked via RC. Only superhets may be used, so several cars can race together. Engines are in the .09-.19 sizes at present. The group prints a newsletter, solicits inquiries to above address.

Another area association: Seeing the advantages of grouping the many clubs in the N. Y. metropolitan area together, a new organization named the Palisades Association of R/C Clubs was set up at a meeting held Jan. 8 in Tarrytown N. Y. At present there are four clubs in the group, which will doubtless be expanded; represented at this meeting were Rockland County RCC, Westchester Radio Aeromodellers, Baychester RCC and North Jersey RCC. All but the latter are in New York state. The first official meeting of the PARCC was on Mar. 22 in Mamaroneck, and the group has planned a fly-for-fun contest on May 26 at the field of the Rockland group. Present Chairman of PARCC is Andy Medwid (16 Woodfield Terr., Tarrytown, N. Y.). As with other such area groups, this one expects to gain strength in numbers, for such matters as obtaining flying fields.

The member clubs also feel they will be better able to coordinate contests in the area — and to keep interest up during the winter months, when the flyers normally lose touch with each other. Other area R/C groups have generally profited in many ways from such grouping; we expect the members of PARCC will doubtless do so too. For those who don't know the significance of the name, the "Palisades" are the towering banks of the Hudson River; all four founding clubs are located in counties bordering the Hudson.

Expert pilot dept.: From the Oily Bird (Port Arthur, Tex.) comes an account of superb piloting which averted disaster. Editor Bob Talley was flying a Class II plane in New

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BROWN JR., DENNYMITE, ANDERSON SPITFIRE, ORWICK. All new, bench tested. Only $50.00 each. **DENNIS MODEL SHOP, Valdosta, Georgia 31601.**

WILL BUY pre-war, large-size model race cars and spark ignition gas engines. **CHARLES WERVE, 6220 Fifth Ave., Kenosha, Wis. 53140.**

FOR SALE: All new in box. Orbit 6-12 Set DS-600 — $360.00, Citizenship DP-5-AER on 72MHZ—$250.00, Citizenship DP-3 — $175.00, Citizenship APS — $135.00. Sailplane Kit — $98.00. Cash for ignition motors. **TENN. RC SUPPLIES, Box #1479, Nashville, Tenn. 37202.**

Orleans meet, when with the plane inverted at the bottom of the vertical eight some items were seen to drop out. Bob throttled back — the engine quit about then — picked a spot in some tall weeds and proceeded to steer the still-inverted craft to the exact spot picked, with gentle turn to final approach and a nice soft nose-high touchdown. Ah, what smoothness propo allows! After accepting many congratulations, he went to retrieve the undamaged plane and the fallen parts; the latter consisted of the fuel hatch cover, the fuel tank, some foam rubber, and the battery pack! All that fine piloting was done by the plane itself!

NEW IN RC

Steerable nose-wheel assembly is new from **BK Model Products (4765 E. Iliff, Denver, Colo.)**; it's of dual-leg style to eliminate side sway. Two 9/64 m.w. legs each have four turn shock absorbing coils, and these and other steel parts are nickel plated to prevent corrosion. Upper ends of wires are held in seamless steel tube which pivots in solid plastic bearing block; latter has holes for bolting to firewall. An adjustable brass tiller arm is clamped to the tubing. The axle assembly is adjustable for both height and width, and assembly will accommodate all standard wheel brakes. From bottom of bearing block, legs extend 5½ — excess length may be cut off. Assembly less wheel is $6.95.

Heavy duty hand fuel pump is stocked by **BK Model Products** (Denver, Colo.) designed especially for handling model plane fuels. Special seal and gaskets impervious to fuel are fitted, and the pump is intended for use in gallon cans. Can be cut down to fit quart cans if desired. This style of pump puts out about an ounce of fuel per stroke, so even full house multi tanks don't require much work. Lists for $6.95, available from hobby shops and mail order suppliers.

Known previously for their line of fine kits, **Andrews Aircraft Model Co. Inc.** (Danvers, Mass.) has announced their first RC model accessory, a steerable nose gear for large RC planes. The dia. is 5/32", single leg is zinc-plated for rust prevention, and kit includes tough plastic mounting bracket and tiller, all hardware and parts to install gear on your plane (except wheel). The ARA-1 package costs $3.95.

As noted in RC World this issue, racing of glow-engined model cars is becoming popular. **Ra/Car Developments** (524 W. Central Park Ave., Anaheim, Calif. 92802) was formed to cater to this growing trade. Concern stocks all necessary parts and assemblies, such as magnesium wheels, tires (a line of genuine Goodyear tires is under development), centrifugal clutch, transmission and rear axle assemblies body parts, etc. Ra/Car modifies .19 engines for satisfactory cooling when buried inside car body, can furnish either K&B or McCoy engines with throttles. Concern offers a complete Indy-Formula 1 car body, chassis and all other necessary parts, including multi proportional control system suited to this work. Send for price sheets carrying full info.

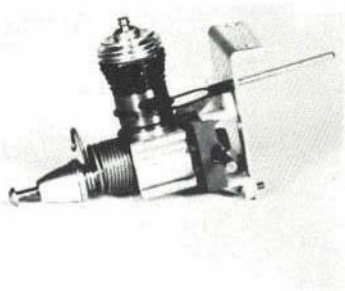
INDEX TO ADVERTISERS

FLIGHT-CONTROL PRODUCTS

1937 Simmons Salina, Kansas 67401

NEW .049 THROTTLE ENGINES

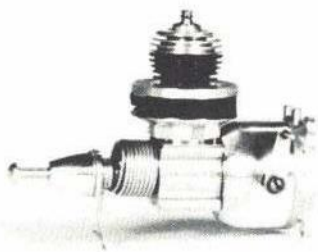
THROTTLES THAT REALLY WORK
CONTINUOUS IDLE WITHOUT FLOODING
DESIGNED ESPECIALLY FOR RC



QUEEN BEE with throttle $10.95

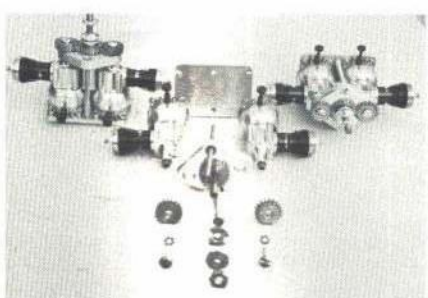
QUEEN BEE: uses the famous Cox Babe Bee crankcase and modified Cox 290 piston & cylinder. New backplate allows you to use your own fuel tank for longer flights. You will be amazed at the extra power available from a QUEEN BEE.

BUMBLE BEE uses the famous Cox Babe Bee crankcase and modified Cox Q.Z. piston & cylinder. Modified tank contains miniature carburetor type throttle. Tank is larger than standard Babe Bee tank for longer flights.



BUMBLE BEE with throttle $11.95
With throttle and muffler $12.95

NEW TWIN ENGINE CONVERSION KITS



BABE BEE OR QUIET ZONE .049 ENGINES
BALL BEARING MAIN SHAFT
TOTAL DISPLACEMENT .098
TOTAL WEIGHT 6-3 4 oz.

Complete Conversion Kit	$19.95
Kit with 2 Babe Bee's	29.95
Kit with 2 Quiet Zone Engines	31.95

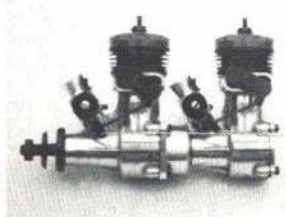
Add $2.00 for assembled units

BY USING THE GEARED CONVERSION KIT AT LEFT AND TWO QUEEN BEE ENGINES ABOVE, YOU CAN HAVE AN EXTRA HOT R/C TWIN 049. THE POWER OF THESE TWINS WILL APPROACH THAT OF .15's.

12,500 RPM with 7x4 props.
8,500 RPM with 9x4 props.

ASSEMBLED AND TESTED	$34.95
COMPLETE KIT WITH ENGINES	29.95

CONVERT OLD OR NEW ENGINES TO ALTERNATE FIRING INLINE TWINS



TWIN K & B ENGINES

Assembled 19's with carb.	$49.95
Assembled 19's less carb.	37.95
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FLIGHT-CONTROL PRODUCTS

1937 SIMMONS • SALINA, KANSAS 67401

MRC·FUTABA

The all NEW MRC-Futaba MU-2 is a completely assembled and painted foam plastic R/C airplane with all necessary hardware, landing gear with wheels, adjustable push rods, control horn, fuel tank and line, metal motor mounts and extra paint and cement.

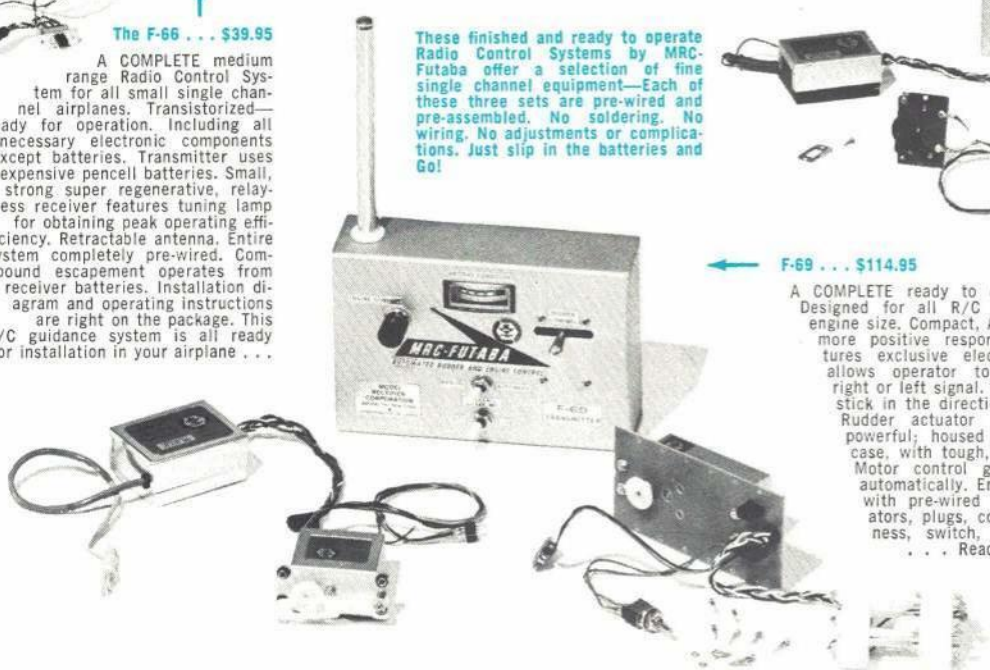
F-68 . . . $69.95

A COMPLETE high powered, long range R/C system. Transmitter operates on inexpensive pencell batteries. Small, compact reliable receiver. Two position motor escapement. Motor operated rudder servo. This entire Radio Guidance System is completely pre-wired for instant and correct installation, and ready for immediate operation.

The F-66 . . . $39.95

A COMPLETE medium range Radio Control System for all small single channel airplanes. Transistorized—ready for operation. Including all necessary electronic components except batteries. Transmitter uses inexpensive pencell batteries. Small, strong super regenerative, relayless receiver features tuning lamp for obtaining peak operating efficiency. Retractable antenna. Entire system completely pre-wired. Compound escapement operates from receiver batteries. Installation diagram and operating instructions are right on the package. This R/C guidance system is all ready for installation in your airplane . . .

These finished and ready to operate Radio Control Systems by MRC-Futaba offer a selection of fine single channel equipment—Each of these three sets are pre-wired and pre-assembled. No soldering. No wiring. No adjustments or complications. Just slip in the batteries and Go!



F-69 . . . $114.95

A COMPLETE ready to operate R/C system. Designed for all R/C airplanes up to .60 engine size. Compact, Automatic for quicker, more positive response. Transmitter features exclusive electronic keying which allows operator to automatically send right or left signal. (Just push the control stick in the direction you want to turn). Rudder actuator is small, light and powerful; housed in a compact metal case, with tough, durable nylon gears. Motor control gives positive signal-automatically. Entire system complete with pre-wired board mounted actuators, plugs, connectors, wiring harness, switch, and battery holders . . . Ready for you to install and enjoy.

FLY RIGHT OUT OF THE BOX—WITH MRC-FUTABA RELIABILITY.

A complete line of single channel, dependable Radio Control Systems—all pre-wired—Just add batteries and you are ready to operate! These R/C systems range from the simple F-66 super regenerative, relayless, rudder only model to the outstanding superhet F-69 with it's automated electronic features that gives you both automatic stick control of rudder and positive action motor control . . . The exciting NEW Mooney MU-2 foam plastic airplane is available complete with all hardware, the F-69 Radio Guidance System (shown above). Also the reliable MRC-Enya .09III TV engine, and propeller. At your hobby shop . . . $159.95—The MU-2 is also available separately, complete with hardware only . . . $39.95—Although the MU-2 is designed for either the F-68 or the F-69 systems shown above, it is extremely suitable for any rudder plus motor control system. Handcrafted in Japan and guaranteed by MRC. Available through your dealer.

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